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THE PSYCHOLOGY OF THOUGHT

APPROACHED THROUGH STUDIES OF SLEEPING AND DREAMING

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PREFACE

Thinking, in the form of perception, may be approached through the studies of familiar categories, such as space perception, time perception, the reading process, illusions, and other experiences in which something like an elementary form of inference may be discerned. Thinking, in the form of argument, reasoning and scientific induction, may be approached through the inquiries of logic and methodology. Or, as a momentary and complex experience, thought may be investigated by the systematic methods of introspection as these have developed in the history of psychology.

In this volume, instead, thought is approached through the phenomena of sleep, drowsiness and the dream. The best justification of this approach will be found in whatever positive contribution the study is found to make to an understanding of "the higher mental processes." Of the many problems left unsolved, and the topics omitted, no one is more painfully aware than is the author.

The book differs from most recent applications of dream observations, in that it finds but scant scientific value in the cherished assertions of the Freudian psychology. But while its attitude toward the Libido, the Unconscious, Symbolism, the Sexual Theory, and Infantilism is entirely sceptical, it seeks nevertheless to indicate and to apply such sober contributions as have from time to time appeared in the literature of "psychoanalogy," in its relation to dreaming, to meaning, and to thinking. The whole literature of this movement, from Herbart, its founder, through Freud, its expositor, to Rivers' recent adaptations of its principles, has a suggestive value, however unscientific its technique and method.

Emphasis is laid throughout the book on the mechanism of "redintegration" as a descriptive and explanatory principle of mental phenomena. This process, described and illustrated in detail in the writer's *Psychology of Functional Neuroses* (D. Appleton and Co., New York, 1920) gives a somewhat changed meaning to the old and well-nigh abandoned term "redintegration." The process which the term is here used to indicate is (without reference to the question of neurology) similar to that which Semon, in "Die Mnemische Empfindung" and "Die Mneme," has called "ecphory." Bertrand Russell, following Semon, has, in his *Analysis of Mind,* made much use of the same process, and designated it "mnemic causation." Woodworth, in his *Psychology* develops a similar principle, called by him "the law of combination." A partial form of the process commonly goes by the name "conditioned reflex" or "conditioned reaction." Closely resembling this process is that described by Thorndike under the heading "associative shifting." The "transfer" of modern psychiatric literature is also readily assimilated to this concept. These are the terms most used by the school of Pawlow. Redintegration is also closely related to the "substitution" of G. E. Mueller, to the "association reflexes" of Bechterew, and to the "associative memory" of Jacques Loeb. But that it is, in certain important respects, different from any of these, the subsequent chapters will indicate.

The process was vaguely hinted at some thirty years ago by Loeb, who insisted that "the fundamental process which occurs in all psychic phenomena as the elemental component . . . is the activity of the associative memory." Loeb means by associative memory "that mechanism by which a stimulus brings about not only the effects which its nature and the specific structure of the irritable organ call for, but by which it brings about also the effects of other stimuli which formerly acted upon the organism almost or quite simultaneously with the stimulus in question." [1]

Loeb's examples show that at times he had clearly in mind what is now called the "conditioned reaction." Thus: "The dog which comes when its name is called, which runs away from the whip, which welcomes its master joyfully, has associative memory." But at other times he is obviously entangled in the old associationist account of the succession of images, without reference to the dualistic conception of "stimuli." Thus: "The odour of a rose will at the same time reproduce its visual image in our memory, or, even more than that, it will reproduce the recollection of scenes or persons who were present when the same odour made its first strong impression on us." Here it is not clear whether it is the phenomenal "odour" or the "smell stimulus" that is effective. Loeb failed to distinguish, as did Semon also with sufficient precision, between phenomenalism and dualism. This may be one reason why "associative memory" and "ecphory" failed to work the substantial revolution for which their advocates hoped.

The difficulty of the older associationism lay not in the descriptive inadequacy of the laws, but especially in the nuclear conception of the "ideas" which were supposed to be associated. In the concept of "redintegration" proposed by Hamilton, the "idea" as a permanent entity, divisible into parts, still persisted. Bradley's famous critique of associationism laid bare the fallacies involved in the use of these mythical "ideas," and it was he who most clearly extended the old laws of association to cover acts, reactions, and events, each as it occurred being a new and unique, non-reproducible item. It is in such a reference to the flow of phenomenal events, assignable to classes, that the present concept of redintegration is especially distinguished from the older associationism.

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[1] *Comparative Physiology of the Brain,* 1900; "Beiträge zur Gehirnphysiologie der Würmer," *Pfleüger's Archiv.,* Band lvi, 1894.

Nor is redintegration, as here employed, the description of the activity of "engrams" (Semon) nor "colloid mechanisms" (Loeb). That those visual and tactile events which we call nerves and tissues also follow the law is not denied. But the present point of view seeks to avoid the visual-tactile bias. Redintegration, as a descriptive concept, is as characteristic of feelings, pains, images, thoughts as it is of the tissues of one's neighbors or the activities of animals. It may therefore be used as a descriptive formula for whatever events manifest it in their sequence. If there are correlated systems, underlying these events, which also show the redintegrative mechanism, this is an interesting fact, but one not implied in the phenomenal use of the concept. Toothaches, as well as organisms, exhibit behavior.

The redintegrative sequence, as the term is here used, may be described as follows: A complex antecedent, ABCD, instigates a consequent, XYZ. Thereafter the consequent XYZ, or one belonging in the same class, may be instigated by the detail A, or a detail belonging in the same class, by virtue of the historic participation of A in the situation ABCD. A partial stimulus is substituted for a total antecedent.

It is of no little interest that this mechanism or principle should have been so widely and apparently independently recognized and utilized within so short a period of time. The author's own statement of the principle and its application began in about 1915 and was published in 1920, in complete ignorance (howsoever reprehensible) of the work of Semon, and before the publication of Russell's *Analysis* and the *Psychology* of Woodworth. He supposed that the development in his own mind grew out of the consideration of Hamilton's use of the word and Bradley's modification of the concept under the influence of the "conditioned reflex" and "symbolism" literature and the various inadequacies of these latter concepts.

The psychology of redintegration is merely that of a new or a better associationism, freed from certain impediments of the older associationism. It was definitely anticipated by Locke and Berkeley, and especially by Edmund Burke in the closing sections of his *Essay on the Sublime and the Beautiful.* Burke here gives a neat account of the power of language and its basis in a "conditioning" process, and is able to account for "non-imaginal" forms of mental activity without the assumption of "pure thoughts."

In the psychology of redintegration the older associationism is clarified and reformed in two important respects. These relate to the nature of the "ideas," the *events* that are associated, and to the old problem of the psychic and the physical orders. No notions of priority are here entertained, and pretense to originality is freely repudiated.

The idea seems to have been "in the air," and the widespread and relatively independent adoption of it is a gratifying indication of its usefulness.

Much use has been made, throughout the book, of material that has appeared over the author's name in various technical journals of psychology and philosophy. Chief among these articles are the following: from the *American Journal of Psychology*: "The Psychology of Drowsiness" (January, 1911), "Influence of Caffein on Quality and Quantity of Sleep" (January, 1912); from the *Journal of Philosophy*: "Vicarious Function of Irrelevant Imagery" (December 9, 1911), "The Psycho-physical Continuum" (March 30, 1916), "Symbolic Relations in Thinking" (September 13, 1923), "Meaning and the Psycho-physical Continuum" (August 2, 1923); from the *Psychological Review*: "Particular Features of Meaning" (September, 1924), "The Definition of Judgment" (September, 1925). Although the titles of some of these papers are used as chapter and topical headings in this book, in most cases the original material has been much elaborated, and in certain instances very important modifications have been made in the interests of greater accuracy and clearness. But the incorporation of these essays into the present articulated whole has not disclosed in them the need of essential revision of the general points of view.

Briefly stated, the volume here presented may be said to be the elaboration and detailed application of two significant ideas or principles, the doctrine of the psycho-physical continuum and the mechanism of redintegration. Through the former an effort is made to clear the psychological path of a number of artificial obstructions inherited from philosophy. Freed from the riddles of the traditional distinctions between psychic and physical, psychology may occupy itself in a straightforward way with those natural events of the continuum that fall to it by virtue of the contemporary division of labor among the sciences. The best way in which to escape from artificial riddles is to gain insight into their genesis. Many distinctions lose existential status once their genesis is clearly understood, and the account of the psycho-physical continuum is essentially a history of the distinction between the so-called subjective and objective worlds.

To the writer, the appreciation of these two fundamental principles, the psycho-physical continuum and the redintegrative sequence, has occasioned an intellectual clarification not unlike the old-fashioned thorough religious conversion. Psychological topics that were formerly only a morass of words or a tangle of unintelligible analogies became both ordered and amazingly simplified. Metaphysical and epistemological bonds were loosed, and psychological phenomena given a genuine place in the real world of natural events. The present attempt to communicate the fruits of this enthusiasm is both halting and feeble. If it should fail to illumine others it may at least serve as a testimonial to the author's exciting intellectual adventure.

H. L. H.

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THE PSYCHOLOGY OF THOUGHT

CHAPTER I

AVENUES TO THE PSYCHOLOGY OF THINKING

> Words are in reality but mere sounds; but they are sounds which being used on particular occasions . . . produce in the mind, whenever they are afterwards mentioned, effects similar to those of their occasions.
>
> EDMUND BURKE

EXAMPLES OF THINKING

A study of the psychology of thought may well begin by inquiring what in general we mean by thinking, what constitute the chief problems in that field, and by what avenue the topic may profitably be approached. A beginning may be made by excluding without delay certain things which we do not mean by thought, and in this way arriving at certain positive indications.

First of all, then, we do not mean physical or physiological processes, considered in themselves. Falling down is not thinking, nor is digestion nor the pupillary reflex. These may become the objects or subjects of our thought, as they are when we now talk about them. Whether thinking *may* ever consist merely of physical or physiological processes, as, for example, the unconscious activity of the brain, we may later have occasion to inquire.

We may exclude also immediate sensory and observational experiences, considered in and for themselves. Having a toothache, watching the sunset, are not thinking. Whether such events may nevertheless take part in thinking, we may later consider. It is clear, at any rate, that we can think *of* them or *about* them. The question will be whether we can think *with* them.

Immediate affective and emotional processes may also be excluded. Feeling happy or afraid, agreeable or excited, are in themselves not thinking, although it is clear, again, that we can think about such feelings. Can we also think with them? This we shall need to investigate; and we shall also be interested in the nature of the so-called "feelings" of familiarity, of confidence, of conviction, and the like, which play such a prominent rôle in thought.

Automatic activity, so far as it merely goes on (rocking in a chair, whistling, saying the alphabet), is not thinking. These are *thoughtless* performances, instances of action rather than of thought. But what shall we say of the instinctive patterns of activity, which not merely go on but seem to have some determinate aim or drive? Are instincts thought? Is thinking an instinct, as some students of human nature have intimated?

Even violent activities, controlled by a purpose—such activities as fighting, breaking rock, sawing wood—we do not ordinarily consider to be instances of thinking, no matter what we may think *about* them. Yet thought is an activity, and thinking may be violent.

Consideration of the occasions on which we do use the words *thinking* and *thought* may suggest in more positive terms just what we mean by these events, processes or acts. It will be useful to enumerate a few such instances, in order to see what they have in common.

We try to think of a man's name; that is, we act in terms of it and with reference to it, although it is not present. When false names come we say, "No, that is not it." When the correct one occurs to us we say, "There, I have thought of it."

When a child has misplaced its toy and cannot tell us where it was left, it is urged to *think*—that is, to try to remember the act, to orient itself toward a past event which, since it has passed, cannot recur.

When a good plan for the future is suggested to us we say, "What a happy thought. What a fine idea." By this we commonly refer to something not yet actualized, but toward which, as a prospect or a possibility, we are oriented.

When interrupted by a caller who asks what we were doing, we reply that we were "thinking of the good old days," "thinking what to do next," "thinking of the San Francisco earthquake," or of "the journey we are about to take." None of these things are present facts, yet we are acting with reference to them. They are either past or future events, and yet we are reacting in terms of them. A six-year-old child burst suddenly into crying and when asked what was the matter he replied that he was *"thinking* how cruel the North was to the South in the Civil War."

We see a man on the street, step up, and slap him cordially on the back. He turns about and we find him to be a total stranger. We say, "I beg your pardon sir; I *thought* you were my uncle." Or we meet an old friend and say "I do not see you often but you are constantly *in my thoughts.*" Again we distinguish between the presence and the absence of the individual. Curiously enough, we may also think about him when he is really present, but this thinking of him is very different from our direct observation of him, and may go on whether he comes or goes.

Finally, not to be too tedious in illustration, we are now *thinking* about the definition of thought. We are in search of a formulation or description that we do not already have at hand, or at least that we are for the time being concealing. We are trying to solve a problem which confronts us, and we hope that a solution is possible, even if not presently available. We are in the position of a childless woman, thinking of her prospective grand children.

PROVISIONAL DEFINITIONS

However powerful thoughts may be, their potency is different from that of things. "Thoughts unexpressed may sometimes fall back dead; but God himself can't kill them when they're said." But thoughts even when unexpressed are real events. If they do not exist in space, they at least occur in time. Readers familiar with Bergson's *Matter and Memory* will recall that strangely disconcerting conception of his, that lost memories continue to exist in time, just as absent objects continue to exist in space. However this may be, we must admit that just as absent objects can be inspected if we go to the right place, so also events not now with us may in some way become effective again. One important difference between thoughts and things seems to be that in the main we have to *go to* things, whereas thoughts and memories *come to* us. However, *moving* objects come to us, even as thoughts do. Moreover, we sometimes seem to be actually *going back* in search of lost memories or of slippery thoughts.

At least we seem to have arrived close to a provisional description or criterion of thoughts. Objects distant in space and events remote in time may be effective in determining our conduct. We may consider them, refer to them, decide about them, evaluate them, compare them, accept or repudiate them, without their physical or temporal presence. We do this by virtue of our *thoughts* of them, as distinguished from our perceptions of them. Perception is confined to the here and now—the specious here and the specious now, to be sure. But thought ranges freely through experience, and may even venture into the historic or the prophetic.

If pressed more closely on the question "How do we think the absent?" we may reply in various ways. The history of philosophy and of a large part of psychology is indeed mainly the story of the answers to this question. Typical answers are, for example: We represent it. We image it. We conceive it. We ideate it. We name it. We feel it. We intuit it. We symbolize it. We know it. We picture it. We act it. We revive it. We recall it. We take an attitude appropriate to it. We enter into it. We understand it. We consciously intend it. We are directed toward it. We point to it. We assume it. Each type of answer commonly implies a whole system of philosophy. A satisfactory reply, however, must keep as far as possible away from a preconceived theory. The theory should follow from the observations, rather than determine them.

Furthermore, there are perhaps at least two different ways in which absent objects and remote events may be effective in determining our conduct. Consider the classical experiments on memory. By virtue of several repetitions of a series of nonsense syllables the learner's conduct is changed. From being unable to recite the series, he becomes able to do so.

Clearly his ability, to-day, to recite the series, is in one sense determined by past events, that is, by his previous repetitions under the guidance of visual clues. If he had not undergone these repetitions of the material he would not now be able to reproduce it. The successful recitation of a series of nonsense syllables is therefore a case in which conduct is determined by remote events. Is it, therefore, thinking?

Presumably the previous trials need not be represented in the learner's present consciousness in order to exert their influence. Action habits imposed upon the vocal mechanism and its neural connections may suffice to explain the difference between the present ability and the former disability. The *knowledge* of the syllables may perhaps consist merely of the fact of these neural changes. Is it, nevertheless, thought?

On the other hand, in certain cases, and especially if the recitation is not entirely successful, the past *repetitions* as actual events may be remembered and represented in consciousness. As so represented, they may serve as clues to a more effective recitation of the nonsense syllables. Here the past events are effective not merely as neural changes, but in such form that the learner can *report* concerning them, and finds a present symbol that means or represents them. They are not only neurally but are also consciously effective. It will be generally conceded that in such a performance *thinking* is involved, along with explicit memory.

Clearly, thoughts are not merely things, and yet are real events. They do not constitute, and yet they in some way stand for, represent, refer to, or mean things other than themselves. We must know what thoughts are in themselves, and we must know how it is that they can *stand for* other things.

A TYPICAL THOUGHT EXPERIMENT

A very simple experiment will illustrate the whole problem. Simple as it is, it may well typify for us the field in which the chapters of this book are to move. Suppose an experimenter exhibits an object, saying, "This is *A*." (It is a red square which is at once concealed.) Then he shows another object, saying, "This is *B*." (It is a green disk, which is also at once removed from view.) Thereupon the experimenter asks you to compare the two things, *A* and *B*. Without asking any questions you write your report on a slip of paper, and pass it to him. A collection of such reports would be found to contain such answers as the following:

A was shown before *B*.
B was darker than *A*.
A was the larger.
B was the more pleasing.
A is square while *B* is round.
Both are made of paper.
B was the more familiar color.
They were colored objects.

Certain obvious tendencies are to be noted in these reports. For one thing, they are made without hesitation.

The experimenter's verbal instructions are sufficient to evoke an array of statements. For the most part, the statements are adequate reports of comparisons, although some deviate from this instruction. Moreover, neither *A* nor *B* is always the subject of the report but, instead, that one of the objects which has *more* of some quality (dark, pleasantness, size, familiarity) is likely to become the subject of the proposition. Certain less obvious but more important features will be shortly indicated.

The experimenter may, to our great profit, repeat the demonstration, using sounds instead of colored papers. Sounds are unique in that they need not be concealed but promptly disappear without the aid of the experimenter. And it is clear that once they have gone they cannot be recovered. To be sure, they may be *reproduced* or imitated. And it is an interesting puzzle to decide in just what sense the new sound is *the same* sound as that formerly heard.

Now, in both these cases two objects, events, or experiences were compared. In the case of the two sounds it will probably be agreed that they can never recur again. They can be recovered only as *thoughts.* It was in thought that they were compared, for they were gone as sounds before the instruction to compare them was given. In the case of the colors one may not feel quite so sure on these points. Do they still exist or have they, too, gone forever? Can we, perhaps, when "shown the papers again," say only that they are *similar* colors or objects, as in the case of the sounds when they too are reproduced? Are they really reproduced, or are they only imitated? This problem of the nature of *identity* is a formidable one in the account of thinking.

If the former sounds are only imitated by new ones, why not also with the colored squares? And how can we know that the imitation is or is not successful? How can we have the past event in mind? If we do not really recall the sounds, then what precisely do we do?

Consider further. There were reported on the slips comparisons of the two objects—reports of the existence of relations between them. Were those relations there before they were asked for? If so, where were they? Did the reporter discover them, or did he construct them? And did he discover or construct them in reality or in thought? Is there any difference between reality and thought? Were the relations there with the first object of the pair? Surely not, for the second was not yet determined. Did the relation arise, then, with the second object, or accompany it? If so, how could this be, since the first object was already gone beyond recovery? How can the existent be related to the nonexistent, the present compared with the past? Or if it was not there until asked for, how could it then be found, since by that time both objects were gone? Is the relation reported a relation between the thoughts of the objects or between the objects themselves?

However these questions be answered, there can be no doubt that the relations were reported. They were perceived, or judged, or inferred, or perhaps vaguely felt or guessed at. But a verdict was delivered, and this delivery of a verdict involves the general problem of the nature of *judgment*. The present thoughts involve the problem of *ideas* and the fact that they refer to the past events raises the problem of *meaning*.

Again, suppose the reporters were asked to grade their certainty on a scale of confidence. Some of them would be very sure, others less certain, and some would surely confess to grave doubts in the matter. What is this *confidence* or *assurance* or *conviction,* that can have so many degrees and that can vary from person to person even among those who gave identical reports concerning the same events? We believe, or doubt, or disbelieve. Our convictions have degrees of firmness. Here we encounter the problem of *belief.* If moral principles or forms of play, rather than sounds and colored objects, were being judged, we might say that *values* rather than convictions were involved.

Consider also what it is we are doing with this experiment. We are sticking to it, coming back to it, overhauling it, inquiring into it, controlled by the insistent purpose of making something out of it, seeing into it, understanding it, and bringing it to bear on the general question of the psychology of thinking. We have begun to *reason* about the problem of thinking.

THE CHIEF PROBLEMS INDICATED

The main problems of the psychology of thought have all been raised by this simple experiment. We may review them as follows:

1. Two tones, one of which duplicates the other, are said to be *the same* tone; successive colored squares are said to be two appearances of an identical paper. Here emerge the features of event and essence, traditionally called the particular and the universal. We may designate this the problem of *identity.*

2. We think of the tone (or color) that has gone; we refer to it or mean it. This raises the problems (*a*) of the

nature of ideas or *thoughts* and (*b*) of the nature of *meaning.*

3. We compare the two events, reporting the relation between them according to our best judgment. Here are involved the two problems: (*a*) the nature of relations and (*b*) the act of judgment.

4. We observe various degrees of certainty, assurance, or confidence. Here are involved the problems (*a*) of *belief* and (*b*) with other materials, of *value.*

5. We discuss and examine, reflect and consider, striving to reach a conclusion, an end, a consequent, or report. In this there is involved the problem of the nature of *reasoning,* and that of *motivation.*

6. Finally, the decisions concerning the colors or the sounds, and our conclusions concerning thought, have degrees of correctness, truth or validity. At this point we should leave the field of psychology and enter the domain of logic, which is not our goal.

Event and Essence, Idea and Meaning, Relation and Judgment, Belief and Value, Reasoning and Motivation—these are the problems encountered at the very beginning of our study of thought. We shall need to inquire what opinions men have held on these problems and what evidence they have adduced in support of their views. Above all, we shall need to find some mode of approach which will lead us from simpler and easier forms of thought to the more dignified and complex forms; an approach which will exhibit the actual occurrence of thoughts, quite aside from any theory about them.

Better minds than ours have in times past struggled for an adequate account of thought. Plato and the Neoplatonists; Aquinas and the Scholastics; Locke, Berkeley, Hume, and Mill; Kant and Hegel; Bradley and Bosanquet—all were obsessed by the problem of thought. Brentano, Meinong, Husserl; Kuelpe and his students, Watt, Buehler, Messer; Stumpf, Binet, and Wundt; James and Titchener; Woodworth and Pillsbury; Washburn, Dewey, Russell, and Schiller—every systematic psychologist has felt the challenge at this point. Even the psychoanalysts cannot make headway without an exploration of thinking, and the thoughtless behaviorists hasten to supply a substitute for it.

We need not start our study with any "point of view," although we shall hope to arrive at one before the end is reached. Our chief intention is to explore the field, to raise into clear light the most annoying and therefore the most interesting problems, and to reach such tentative conclusions as the evidence seems to justify.

CERTAIN LIMITATIONS

We may before going further point out certain limitations to the field of our inquiry. We are to investigate the *psychology* of thought, not its logic, its pedagogy, nor its epistemology. What now are the differences between these various fields? What are the distinctive psychological problems?

The pedagogy of thinking is illustrated by various books dealing with the provocatives of thought, the wisest procedure in reasoning, the best ways to stimulate thought, the most useful methods of educating for thoughtfulness, and the adaptation of the materials of teaching to the general character of thinking. We shall make use of such materials only in so far as they assist us in knowing what thinking actually is. The difference may be illustrated by that between a manual on "How to Cook" and one on "What Cooking Is."

The logic of thought is mainly an exhibition and critique of the validity of reasoning, the source and nature of fallacies, the modes of expression and formulation, the canons of proof, the technique of observation, inference, and discovery, with much emphasis on the laws of grammar, rhetoric, and mathematics. The so-called "laws of thought" of logic are really not laws of thinking but laws of things, especially of those things called relations. We may be of service to logic, but logic can be of little service to us in this enterprise.

Epistemology represents the critical consideration of the possibility and implication of thinking. If thoughts represented things, just how can this be? What kind of world does it imply? How can we know, and how fully can we know the world, and just what kind of world is it if it can be known? Epistemological problems will unavoidably arise in our investigation. We may even be compelled to adopt provisionally some epistemological assumptions. But at least we can postpone this act to the very latest possible moment.

The psychology of thought, on the other hand, is a descriptive adventure. We inquire what thinking is, how it goes on, what various materials it employs, what forms it assumes, to what influences it is susceptible, and what are the conditions of its occurrence. And we may be sure that pedagogy, logic, and epistemology will wait for us, for, until we know more fully just what thinking is, their own enterprises are premature and risky.

THE PRESENT APPROACH

The approach chosen is through the phenomena of sleeping and dreaming. In sleep, thought ceases; in drowsiness, thought is seen making headway with the most meager equipment; in the dream the nature of thinking is so clearly exhibited that only waking reflection can rob dream verdicts of their coerciveness. It is this gradual revelation of the nature and mechanism of thought that suggests the approach we have chosen, and justifies that more or less complete discussion of each of the phenomena which precedes our indication of their bearing on the psychology of thought.

Sleeping, dreaming, and thinking, separately considered, are topics of perennial interest. Of these, the first two topics are commonly associated in psychological discussion, as in daily life. But thinking is, instead, more often contrasted with dreaming, because of its greater purposiveness; and thinking is also contrasted with sleeping on the ground of its more obvious activity.

In the present instance, however, all three topics are associated, in the belief that such association may make some useful contribution, especially to the study of thinking. Our endeavor is that of applying to the more complex thought processes certain principles of mental formation and organization as these are revealed in the study of drowsiness and dreamy states. The assumption is that thinking is not a new phenomenon, encountered first on a high level of reflective inquiry, but that its elements are to be found in even the simplest and least purposive of intellectual operations.

Sleep is therefore considered for its possible instructiveness in understanding the phenomena of drowsiness and the dream, and these bizarre and fruitless experiences are in turn considered for the sake of such information as they may afford concerning the materials and mechanisms of more dignified mental enterprises.

CHAPTER II

SLEEP AS A NATURAL PHENOMENON

> The characters of nature are legible, it is true; but they are not plain enough to enable those who run, to read them. We must make use of a cautious, I had almost said a timorous, method of proceeding. We must not attempt to fly, when we can scarcely pretend to creep.
>
> EDMUND BURKE

THE MYSTERY OF SLEEP

That sleep is a mystery has been so long recognized as to have been almost forgotten. Carlyle, in *Sartor Resartus,* gave expression to one aspect of this mystery in the exclamation of Teufelsdröck in rather earnest talk one midnight when he had returned from the coffee house. "*Ach mein Lieber!* . . . That stifled hum of Midnight, when Traffic has lain down to rest . . . and only Vice or Misery to prowl or to moan like night birds, are abroad; that hum, I say, like the stertorous, unquiet slumber of sick life, is heard in Heaven. Oh, under that hideous coverlet of vapors and putrefactions and unimaginable gases, what a Fermenting-Vat lies simmering and hid. . . . Upward of five hundred thousand two-legged animals, without feathers, lie around us, in horizontal positions; their heads all in night caps, and full of the foolishest dreams."

Every night, in the city of New York, six million people slow up their momentum, abandon their work or play, crawl away into a darkened corner, and sink into the stupor—a stupor that seizes upon them for one-third of the hours it is given them to live. Millions for the unconverted heathen; state and federal departments for the suppression of alcohol; but no interest on the part of any of our guardians in this lifelong nightly stupor of mankind. And when it is suggested at a later point that no one has ever been able to give any sensible reason why civilized beings must continue to sleep, it will be obvious that it is only our familiarity with the phenomenon that makes us so indifferent to the stupendous burden it inflicts upon us.

It has become a platitude that great natural phenomena, when they occur repeatedly and uniformly, arouse in us little interest. They customarily excite less curiosity than do trivial occurrences which come less frequently. Thus, the periodic occurrence of the seasons, the regularity of the tides, the freezing of water, excite in the mind of most of us no special wonder. They are taken for granted as part of the universe. But some insignificant event, an overturned milk wagon, a dog fight, a 10 per cent decrease in the price of Fords, arouses not only local excitement and comment but eventually becomes part of the syndicated news column.

Among the phenomena of the former class come the facts of sleep. Every one sleeps, and scarcely any one gives the matter a thought, unless his sleep is disturbed. And yet what an amazing phenomenon it is, which involves every human being in a profound stupor for a third or more of his natural life. To the extermination of the mosquito, who after all is not a very imposing enemy of mankind, we appropriate millions of dollars. The destruction of the common house fly stimulates a national campaign of enthusiasm. Vast fortunes are left to endow research which may eventually deliver us from cancer and tuberculosis or yellow fever. But the greatest scourge of mankind is allowed to rage unmolested, unendowed, and almost uninvestigated.

It is of course not true that no thought has been given to the subject of sleep. The poets and the doctors, living as they do somewhat on the surface of things, have written a great many pages of exclamation and admonition on the subject. Primitive men and savages seem to have been awed by the strange phenomenon and feared it. Sleep was sometimes described as a period when the soul, that little manikin who was supposed to live inside each one of us, abandoned the body for a time, to travel in strange places or to revel with the demons. Savages are reported in some places to be afraid to awaken a sleeper for fear this soul will be frightened away and never return. Perhaps the superficial resemblance between sleep and death was in part responsible for these fears and superstitions, as well as for the analogies and figures of the poets.

There is a widespread taboo against intimations that sleep may not be a profound biological necessity. Proposals to investigate the possibility of the elimination of sleep commonly meet with scorn or with active resentment when the reception is not marked by complete hilarity. Sleep is valued by many as one of the cherished experiences of life, and deprecation of the phenomenon seems often to be regarded as a more or less profane form of jocularity, or even as a suspicious sign of probable mental disorder.

Various popular devotional hymns celebrate the shelterseeking aspect of sleep, and it is not uncommon to find the nocturnal stupor portrayed as a foretaste of eternal bliss. Thus:

When the soft dews of kindly sleep
My weary eyelids gently steep,
Be my last thought how sweet to rest
Forever on my Saviour's breast.

THE SLEEP OF PLANTS

Flowers and leaves, in their opening and closing in daylight and darkness, strongly suggest that the plant of which they are parts undergoes a rhythmic series of states, not unrelated to the alternation of wakefulness and stupor in the case of animals who sleep. The botanist may be inclined to explain these reactions as simple tropisms or as direct physical or chemical effects of changes in the surroundings. But there is evidence that something more inherently a part of the organism is involved.

Semon reports that he took young Acacia shoots which had never been exposed to the light. One set he then illuminated for six hours and darkened for six hours alternately for several weeks. Another set he alternately illuminated and darkened in twenty-four-hour periods. After several weeks of this, the plants were put either in constant illumination or in constant darkness. For some time they showed periodic opening and closing of the leaves, but not in the six- nor twenty-four-hour periods he had sought to induce. Instead they opened and closed in twelve-hour periods, this being the length of period that had characterized the ordinary parent Acacia stock, living under natural conditions.

Plants kept from the beginning in either permanent light or constant darkness showed no such rhythmic behavior. Those left in darkness simply did not unfold; those kept in the light unfolded their leaves to a certain point and kept them there. The alternate opening and closing, in other words, had first to be set up by alternation of light and darkness as stimuli. Thereafter they continued even in the absence of these stimuli, quite as if the plant had formed a permanent habit of sleeping and waking. But the rate of alternation conformed to hereditary standards rather than to the standards set up in the individual's own life history. This seems a curious inversion of what we commonly assume to be the case with human sleep. In that case we are more likely to suppose that the alternation of sleep and waking has an hereditary or instinctive basis, but that the rate of alternation is largely a matter of habit or convention.

SLEEP STATES OF ANIMALS

Something resembling our own sleep state is to be observed in many of the lower animals, although it is extremely difficult to be sure that an animal or even a human being is or is not asleep. Even in the human being there are many conditions of quiet, unconsciousness, and stupefaction that a superficial observer may mistake for sleep. On the other hand, many complex activities, such as talking, walking, climbing out upon the roof, or even sawing wood, may be carried out during the state of sleep. Indeed, many of the important organic processes, such as breathing, the beating of the heart, digestive processes, and the activity of various glands, take no part at all in the sleep state.

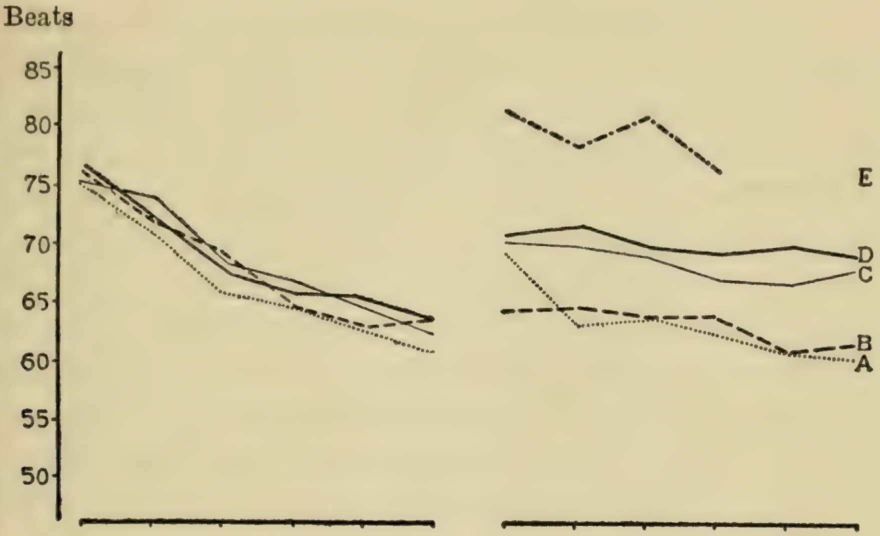
Of the actual sleep habits of animals little seems to be known. It is, of course, true that many animals have alternating periods of activity and quiescence. The locusts, katydids, fireflys, moths, bats, owls, and other nocturnal animals begin their activities with the approach of darkness, and as day dawns they retreat under cover, to await another night. On the other hand, many insects, as the bees, wasps, butterflies, most of our familiar birds and our domestic animals, quite reverse this process.

Now there is sufficient justification for these reactions, quite aside from the usual excuses given for sleep. By remaining quiet during daylight hours the large and slow-flying insects escape their natural enemies, the swift-flying daylight birds. On the same basis the birds, by retreating at night into concealment, escape the prowling animals that prey upon them. Birds, it should be noticed, have no particular sense of smell, and since the sense of sight is their main protection and guide, they require daylight for their own activity. Hence, even if there were no such thing as sleep, it would be a wise biological device for some animals to remain concealed and quiet during the night, while others show the same tendency during the day. That these reactions are thus instinctive is indicated by the frequent observations that changing the situation brings a changed reaction. The darkness of an eclipse sends the chickens to roost, while shortening the dark period by using artificial illumination is said to throw them into prolonged activity and productiveness.

Experiments on some animals suggest that their sleep is more like our state of drowsiness than it is like profound slumber. Frogs, guinea pigs, cats, and dogs may easily be put into a state of sleepiness that does not seem to be deep sleep. If the animal is firmly held, by the hand or in a cloth, the body gently stroked, the movements limited, the eyelids closed with the fingers, in a short time it becomes passive, relaxed, quiet, and may be placed in unusual and awkward positions without attempting to right itself. The eyelids remain closed, and if they are forcibly opened the eyeballs are found to be turned upward and the pupils of the eyes contracted. The younger the animal and the better acquainted it is with the investigator, the better the experiment succeeds. Usually these states are unstable and irregular, as are our states of drowsiness. Occasionally the quiet period of inactivity is prolonged to half an hour or so, and unless the animal is disturbed it seems to the observer to be doing what human beings call *sleeping*. Whether it is really unconscious and in a stupor, as we are in sleep, or whether it is merely comfortable, indifferent, lazy, and disinclined to act, but still aware of what is going on, as we are in drowsiness, it is extremely difficult and perhaps impossible to determine.

THE SLEEP OF HUMAN BEINGS

Passing, then, from the sleep of animals, about which so little is known, let us consider the sleep of man, concerning which we know at least a little more. The symptoms of sleep, in a general way, can easily be given. A relaxed state of the muscles usually gives the sleeper a recumbent position; he lies prone or slouches in his chair, with shoulders fallen forward and head drooped. The eyelids are closed, the eyeballs turned upward, the pupils of the eyes contracted. Voluntary movements are in the main inhibited, except for occasional shifts of position. Breathing is slower. The most recent and thorough studies of the changes in circulation report little or no change in pulse rate, an increased volume of blood in the brain, and a fall of general arterial pressure. There is a decline in



Showing the General Lowering of the Pulse Rate throughout a Day of Work

The twelve succeeding lines indicated on the base represent twelve successive measurements, six in the forenoon and six in the afternoon, with an intervening lunch hour. On the vertical line is indicated the pulse rate, in beats per minute. The curves are the averages of six subjects, in each case for two days, each point thus being the average of twelve records.

Curves A and B give the results on Normal days or on days when a Control dose was taken, respectively. Curves C and D give the results when Small and Large doses of alcohol, respectively, were administered at the lunch hour. Curve E shows the effect of a heavy meal at the lunch hour.

In general, the pulse rate slows down as the day goes on, unless modified by bodily activity, food, drugs, or similar agencies.

(Curves from Hollingworth: *Influence of Alcohol.*)

temperature and a decrease in the amount of carbon dioxide thrown off by the system, the minimum being reached at about four or five o'clock in the morning. There is said to be increased activity of the peripheral glands, such as the sweat glands.

The most striking symptom of all is unconsciousness. The sleeper is unaware of what is going on about him, unless these events are so intense or unusual as to awaken him. Upon awakening he finds no memories of the events that transpired during his sleep. From the point of view of the observer, as distinguished from the sleeper, this condition shows itself as a failure to react adequately to ordinary stimuli. Sights, sounds, odors, contacts, of ordinary intensity, provoke no overt response, or only a restlessness. Careful observation, however, shows that even these ordinary stimuli produce changes in the sleeper's breathing, its depth or rate, in the height and rate of his pulse, in the volume of blood in the brain, and in blood pressure.

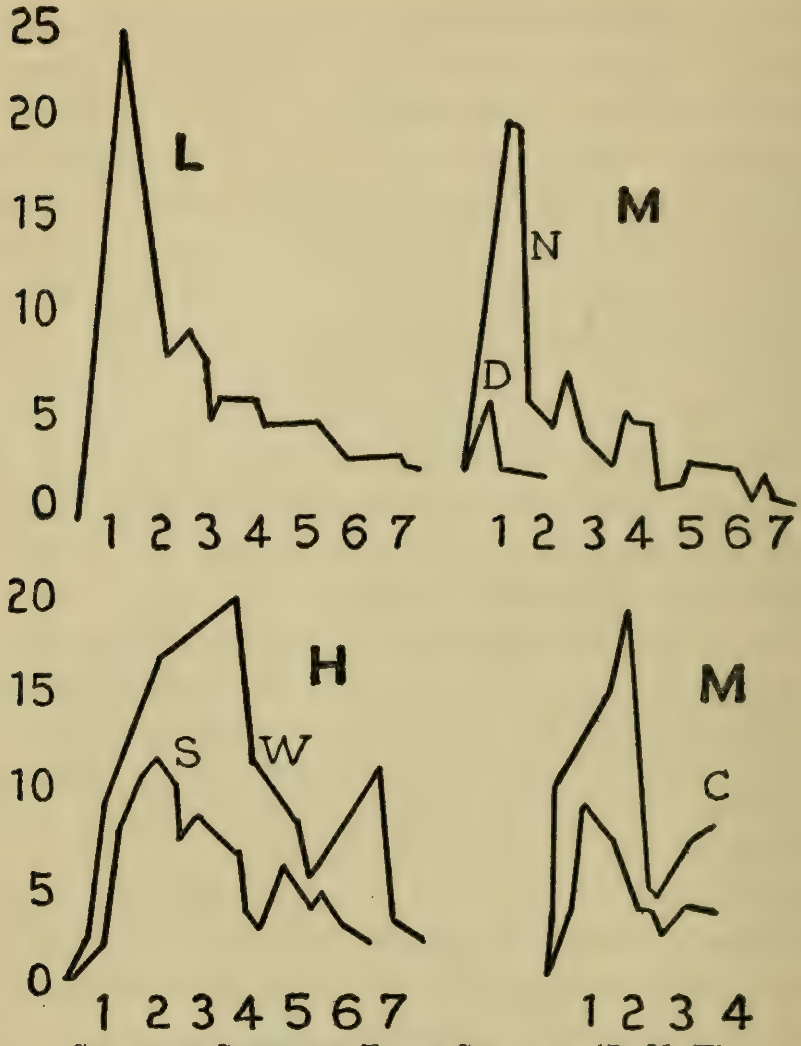
Thus disturbance during sleep, such as being touched or pinched, having a light focused on the eyelids or an unusual noise made in the room, seems invariably to cause in the brain a rise of blood pressure, a decrease in volume, and a smaller pulse. In addition to these reactions, the simple reflexes, especially those of a protective sort, remain active.

THE DEPTH AND QUALITY OF SLEEP

These are the gross symptoms of sleep, and they are in some ways the least interesting. The nature of other symptoms, somewhat less obvious in character, will be considered in another connection, under the head of drowsiness. We may add here, however, the fact that the depth of this stupor does not seem to be uniform throughout. At any time a stimulus of sufficient vigor will arouse the sleeper. If, for example, this stimulus is a noise made by dropping a ball of iron upon the table, we can measure the depth of the sleep by dropping the ball from a higher or a lower point and thus making a louder or a fainter noise. The energy required to waken the sleeper is in this way found to depend on how long he has been asleep. The following curve results from such a series of experiments, which of course extended over many nights of sleep. What we may in this sense call the point of deepest sleep comes about an hour after falling into slumber. During the second hour there is a rapid rise out of this profound stupor, and beyond that point the curve changes gradually until it reaches the base line which indicates the waking state.

It would be an interesting result if we could assert that the depth of sleep, as measured by the intensity of stimulus required for arousal, is also a measure of the beneficial character of the sleep (if such beneficial character there be). But this would be a pure assumption. If it were true it would mean that the first hour or two of sleep achieved the greater part of the benefit, the remaining five or six hours appearing then to be a waste of time. Or we might recommend that the sleeper be awakened after two hours, and then put to sleep again in order to pass into another profound state. But there is no evidence that such an assumption would be correct, and the fact seems to be that whatever beneficial results sleep may have are better produced by continuous than by interrupted sleep.

Aside from the question of the profundity of sleep, the measurement of sleep quality in general affords many difficulties. Presumably the soundness, uninterrupted-



Curves of Sleep for Three Subjects (*L*, *M*, *H*)

N, night sleep; *D*, day sleep; *S*, summer sleep; *W*, winter sleep. *C*, sleep after narcotics. The numbers on horizontal lines show hours after falling asleep; the numbers on the vertical lines give the energy of the falling ball in thousands of gram centimetres, *i.e.*, the weight of the ball multiplied by the height of the fall. (Michelson, copied from De Manaceine.)

ness, duration, and perhaps the changed feelings upon awakening, might serve as signs of quality. But these are also difficult to determine. In various experiments on the influence of drugs and the like, the human subjects have sometimes been required to report each morning the approximate number of hours slept during the night, and to describe the quality of sleep as "better than usual," "ordinary," or "worse than usual." Assigning a value of 2 to ordinary sleep, and values of 3 and 1 to sleep that is better or worse than usual, and accepting the hours of sleep as reported, quantitative comparisons have then been attempted.

It will be recognized that such measures of sleep quality are rough and approximate at best. But it seems equally obvious that they are as accurate measurements of the thing in question as can well be secured. The individual himself is the only one who knows anything about the customary quality of his sleep. And the judgment is at best only an indirect one; that is to say, the quality of sleep is inferred from observations made during waking moments. The number of hours slept, the number and character of dreams, the interval after retiring before sleep ensued, the amount of movement, and the number of awakenings during the night, general feelings of relief or languor after arising, all play their part in such judgments.

But in daily life we usually pass just such judgments as were used in these experiments, and we use about the same categories. We pronounce ourselves to have slept well, poorly, or about as usual. Crude as these measurements of sleep confessedly are, they nevertheless serve to reveal very clearly the influence on sleep of such factors as drugs, excitement, suggestion, worry, changed surroundings, and the like.

CHAPTER III

THE CAUSES OF SLEEP

> Everyone knows that sleep is a relaxation; and that silence, where nothing keeps the organs of hearing in action, is in general fittest to bring on this relaxation; yet when a sort of murmuring sounds dispose a man to sleep, let these sounds cease suddenly, and the person immediately wakes up. . . . This I have often experienced myself, and I have heard the same from observing persons.
>
> EDMUND BURKE

CLASSICAL THEORIES

Having now given the descriptive account of sleep, we are in a position to inquire what brings this state about, and what function the stupor serves. On this point nearly every one who writes about sleep devises a different theory, and it must be said that all explanations of sleep are still in the theoretical stage. No one has yet given an adequate scientific justification for this absurd stupor that consumes one-third of man's time and at least one-half of his leisure. There have been six main groups of theories advanced to explain the phenomenon of sleep, and it will pay us to consider these briefly, if only to see how far short they fall. The theories of sleep are commonly classified in the fashion here adopted.

The first group of theories usually recognized includes the so-called *physiological* explanations. Some physiological change, of a more or less mechanical kind, is supposed to interfere with the activity of the brain and to leave only the lower nervous centers active. Thus a congestion of the tissues at the base of the brain, or a swelling of the thyroid gland in the neck, have both been held to cut off communication between the higher and lower centers. Or cerebral anæmia, insufficient blood supply in the brain, has been supposed to stupefy it, the blood having been drawn to the trunk or limbs during the day's work. On the other hand, just the reverse process, a congestion of blood in the brain, has been supposed to be responsible for the stupor, by compressing the tissues and interfering with the function of the brain cells.

Theories of the second group assume some *chemical* basis for sleep. Sleep, according to these accounts, is a state of being poisoned, a condition of auto-intoxication. It is well known that some drugs put one into a state of stupor, and that toxic substances, such as alkaloids, carbonic acid, and the like, are produced in the urine and in the various other bodily excretions. These poisons are supposed to accumulate until they overpower the system and throw it into the sleep stupor until the system has eliminated the poisons, or until they have been neutralized by the production of counteracting substances. Detailed account of *how* these poisons produce stupor is not often attempted.

In the third place come the *histological* theories, based on the study of the nerve cells and their conduct. Between and around the nerve cells, the neurones, supporting them in a meshlike tissue, are the neuroglia or supporting cells. According to one speculator, these neuroglia cells become congested and swollen during waking hours, thus crowding the nerve cells farther and farther apart until they can no longer communicate with one another, whereupon sleep ensues. According to another theory the nerve cells or neurones are themselves capable of independent action, being able to extend or retract their filaments, the dendrites, just as an amœba manipulates its pseudopodia. Mental activity and consciousness depend on these finger-like branches being extended toward neighboring cells, thus establishing communication. But when bedtime comes these neurones are supposed to withdraw their extended arms and the organism becomes inert and stuporous —in other words, falls asleep. Evidence has been sought in the comparison of animals killed while asleep with those killed while awake.

A *biological* account of sleep suggested by some investigators, has much to commend it to our reason. This theory would relate sleep to the periods of inactivity displayed by the insects, birds, and other animals under conditions which make them easier prey for their foes. Sleep is, on this account, not a passive state but an active instinct, a specific reaction to the stimulus of darkness. Its origin is to be found in the early life of our primitive ancestors, and in the process of natural selection. Those who insisted on prowling about both day and night failed to survive as well as others, because in the darkness of those primitive unelectric days they were so easily destroyed by lurking foes and wild nocturnal animals; lost their way in desert or forest, were swallowed up in swamps, or dashed over unseen precipices. So they left no descendants, or few at least, to mourn their fate and to imitate their sleepless example. On the other hand, we may suppose that those who were predisposed to activity only in darkness were the foolish and feeble-minded, who having eyes to see would not use them, and so they also perished, leaving as our genuine ancestors those cautious savages who went abroad in daylight when their way was clear before them and hid in utter silence and quiet as night came on. This being difficult for a healthy man to do, those individuals were favored in survival who had, as an accidental variation, a tendency to react to darkness by stupor, just as the opossum reacts to a sudden attack. Thus arose sleep, a congenital instinctive adaptation to darkness. This instinct we inherit in spite of its uselessness in an era that by pressing a button can turn night into day. We inherit it just as we do our annoying appendix, our eyebrows, our useless tonsils, our dangerous wisdom teeth, the degenerated muscles that wiggle our ears, and a number of other vestigial traces of our lowly origin.

In another form of biological theory sleep is considered to be an active and protective instinct, intended to preserve us from the accumulation of poisons and fatigue products. Without this instinctive stupor, depending on some active adaptation of the neurones, it might be supposed that the continued activities of waking life would consume the reserve of energy, and thus bring disaster upon the organism. Sleep is thus conceived not as the result of congestion, anæmia, or poisoning, but, instead, as a device for avoiding these catastrophes. Such theories afford an excuse for sleep, or justification of it. They do not, however, present an account of the mechanism of sleep, nor of what sleep essentially is.

Another theorist has explained sleep as a gradual rise of sensory thresholds throughout the nervous system. Put the hand in water that is appreciably warm, and in a few moments the threshold of sensitivity has so risen that complete adaptation has occurred. The water no longer feels warm unless additional heat is applied, for this amount of temperature, as we say, cannot get over the threshold. If the temperature be not raised but remain constant, the hand may then be said to be asleep to that temperature. The rise of the threshold of sensitivity requires a stronger stimulus if we are to be conscious of it, if we are to waken to it. Thus we become adapted to any constant or monotonous stimulus, to the hats on our heads, the odors of the subway, the colors of our goggles, the ticking of the clock, the hum of the city, and to all the manifold stimuli of our environment. In time we are adapted to them all, since all the thresholds have risen, and this state of complete adaptation is sleep. If we now remove ourselves from stimulation as far as possible, by taking off our clothing, closing our eyes, going into a darkened room from which noises are so far as possible excluded, a readjustment of thresholds will in time occur, and as this happens we awaken. First we awaken perhaps to touch, then to sound, and last of all to sight. One difficulty with such an account as an explanation of sleep lies in the fact that absence of stimulation puts us to sleep as well as does monotony. Absence of stimulation is, to be sure, a form of monotony, but it can scarcely be conceived, without other influences, to result in a rise of sensory thresholds.

Much the same difficulties apply to the theories expressed by Rignano and by Bergson, which explain sleep as merely loss of interest. "To sleep," says Bergson, "means to disinterest oneself. We sleep in direct proportion to our disinterestedness." Rignano concludes that if "the affective activity is reduced to a minimum the state of attention entirely ceases and we experience monotony or tedium. If this state of affective activity is reduced to zero, we have the condition of sleep." The difficulty here is that of making sure of the causal relations, or even of determining whether any are present. No doubt one who had lost interest in everything else might well be expected to fall asleep. But it is equally true that sleepiness (however induced) is a strong handicap to interest of any sort. We might, with truth, paraphrase Bergson's statement by saying that "We lose interest in direct proportion to our sleepiness." Sleepiness and disinterestedness are concomitant phenomena, without doubt, but both are equally in need of explanation.

This gives us five of the six main groups of theories. Before giving an account of the sixth, it may be well to point out certain striking things about sleep which manifestly prove all these theories, except perhaps the fourth one, the instinct theory, to be entirely inadequate. We may then look for a sixth explanation which is at least in better accord with the descriptive facts of sleep.

There are, it must be said, many other theories of sleep aside from those here described. Thus, sleep has been said to be caused by the action of a special "sleep center" in the brain; to be a mild form of epilepsy, showing itself in periodic attacks of unconsciousness, not accompanied by convulsions; to be chemically or mechanically caused by the endocrine glands; to represent a partial collapse of our organized hierarchy of motor reaction patterns. Again, sleep has been asserted to be a defense reaction against the intolerable conditions of human life, a retreat from reality, an attempt on the part of the sleeper to get back again to that apathetic and irresponsible condition experienced in the mother's womb, in the days preceding birth. This suggestion is supported mainly by the observation that the sleep posture of many persons resembles the posture of the fetus, the unborn child. These speculations are so fantastic that they do not deserve our serious consideration at this point, although, where our ignorance is so great, every one should be allowed his own bit of speculation. But any explanation, to be seriously considered, should accord with the facts about sleep. Let us submit these main groups of theories to this test.

THE TEST OF SLEEP THEORIES

In the first place, note that sleep does not affect the entire organism. That important organ, the heart, for example, keeps up its work without ceasing, and with little or no change in rate. The diaphragm goes on working and the sleeper breathes. The simple reflexes, many of them at least, are in constant readiness for action. Even many of the voluntary muscles, such as those maintaining the posture of the body, may remain in contraction, so that one may sleep in a sitting position, or even, if the reports be true, standing, or riding on horseback. Certainly no theories based upon the action of poisons in the system, congestion, or anæmia of the nervous tissues, mechanical shrinking of the neurones, or adaptation to constant stimuli, are reconcilable with these facts. And if these important parts of the system never sleep, it is far from obvious why the rest of the system must pass into a stupor. The function usually attributed to sleep is the restoration of energy and the building up of tissues. But the most constantly employed organs and nerve centers seem not to need such a period of inactivity. Perhaps, it may be said, these organs recuperate in the intermittent inactive periods of their rhythmical work. But this intermittence of function is as true of our other organs, our hands and feet, eyes, jaws, and so forth, as it is of the heart and diaphragm. Why, then, do we require sleep at all? Here all the mechanical theories fall down again, for it is not clear why such mechanical accidents should not affect the sleepless organs also.

Note in the next place that sleep does not come on suddenly and irresistibly, as if produced by a mechanical process. We can delay sleep at will. You can, if you like, go to sleep during the reading of this chapter; or you can, with a certain effort, remain awake at pleasure, until nine o'clock or until midnight or even up to a period of four days. But by no such act of purpose can you control the action of poisons, the swelling of the thyroid, or the congestion of the neuroglia. Again, the mechanical theories do not square with the facts. Sleep, whatever else it may be, is in part a voluntary act. Certain *conditions* to be sure must be met, or at least they favor the process. We sleep more easily and quickly if we lie down in a quiet room, in the dark, after a warm bath, not having had more than two cups of coffee or more than one strong cigar. Many of us have an elaborate ceremonial which must be gone through with before we can fall asleep; we must make sure the door is locked and the window open, must say our prayers, lie for a few moments on the back, then turn upon one or the other side, or perhaps with the face away from or towards the wall, adjust the pillow to a specified height, and assume a particular bodily posture. We can delay sleep until this ceremonial or ritual is completed, and once it is finished we can sleep, unless we decide not to.

Further, the natural sleeper can always be awakened, and this is an important fact. Immediately after having been overcome by the poisons, the congestions, and the anæmia of the mechanical theories, he can be awakened and at once proceed to carry out a long and arduous task and remain awake for hours thereafter. Such a state is far from resembling the stupor of poisons or the profound inertness of the epileptic seizure. The mechanical and physiological theories again fail.

So far as the circulation theories are concerned, relating to the congestion or anæmia of the brain, the most careful work shows that the changes in circulation lag behind the mental process; that is to say, the person loses consciousness before delicate instruments attached to the brain reveal any changes in circulation. Further, the person is awake and conscious before the observable circulation changes begin to occur. Apparently these mechanical changes are not the cause of sleep, but only some of the effects.

A most important observation is that the sleeper before passing into the stupor can determine that a certain stimulus, and that only, among ordinary stimuli, shall awaken him. And the selected stimulus becomes endowed with this power. The sleeping mother, slumbering profoundly among numerous irrelevant noises, is quickly aroused by the feeblest moan from the cradle in an adjoining room. The telegraph operator sleeps through the din of his instruments until that particular combination appears which represents his own call or signal. At once he is alert. It thus appears possible so to establish a particular pattern in the brain that this particular pattern alone may remain awake and attentive, responsive to its appropriate stimulus. Such control presents a formidable difficulty to any physiological or, at least, to any mechanical explanation.

A further point bears in somewhat the opposite direction. It is, namely, that all these facts just cited are true only within or up to certain limits. The resolution to awaken at a predetermined faint signal cannot be infallibly relied on. It is surer and safer to rely on a more intense or a more persistent stimulus—an alarm clock or a faithful friend. Sometimes the sleep is so profound that a variety of stimuli, all added together, are required to get the sleeper out of bed; one stimulus alone may disturb him but fail to bring him fully to consciousness. And as for the ability to postpone sleep beyond the usual bedtime, and to shorten the sleep period, this if persisted in to a sufficient degree will mean discomfort and grave danger to the individual concerned.

A favorite mode of medieval torture took the form of keeping the prisoner awake for extended periods of time. Two investigators remained awake, for experimental purposes, for a period of ninety hours, nearly four days. By the end of this time they began to show loss of motor power, enfeeblement of memory, sluggishness of reaction, and they experienced vivid and distressing hallucinations, especially in the field of sight. However, when they did sleep, they report that 16 per cent to 35 per cent of the time lost from sleep was sufficient to restore them to their normal condition. Similar results are reported by other experimental observers. The same amount of lost sleep in the case of puppies is said to be fatal. But, as has been said, the data on the sleep of animals are not very reliable.

SLEEP AS AN ORGANIC RESPONSE

In general then, we cannot adequately conceive sleep to be a condition mechanically or physiologically imposed upon the nervous system through the agency of pressures, poisons, and the like. Sleep is a response of the individual; it is an act *mediated by* the nervous system rather than a state imposed upon it. Normal sleep shows so many differences from the states of stupor and insensibility induced by anæsthetics, narcotics, and other drugs, that the resemblances between the two conditions must be regarded as more or less superficial.

Sleep, it would seem then, is a response to a stimulus, the nervous system being at one and the same time the medium through which the adjustment is effected and also the effector which is adjusted. This presumably means that one portion of this system is thrown into its characteristic adjustment through the mediation of another portion of the system. It is not usual to speak of the nervous system as an effector mechanism, however, and to this fact is due, in some measure, the current mystery of sleep.

The fact that sleep seems to be a native response in the case of newly born infants is no argument for its biological inevitability. The grasping reflex, for example, is also present in infants, but in a few months it has disappeared, or at least given place to other forms of manipulation. It seems most intelligible to suppose not that this reflex "disappears" because of any inner law of its being; instead it is presumably stamped out or modified on the grounds of its practical futility or its occasional positive dangerousness. Except for the futility and the danger, we might expect the grasping reflex not only to remain as a permanent feature, common to all individuals, but to become strengthened, and to compel the organization of other manipulations around itself. The reflex would then be looked upon, no doubt, as a biological necessity of the organism.

The grasping reflex, which we have just considered, is commonly described as a vestigial adjustment, which disappears because of its inutility. It seems far from absurd to conceive the sleep reaction of the newborn infant as a similar vestigial adjustment, philogenetically serving for the protection of the helpless individual. In the case of human infants, at least, it is easy to see how this useless vestige comes to serve a new purpose; it is fortunate for the parents, nurse, and companions of the infant that he does occasionally fall into a stupor. This enables them to relax their vigilance and to go about their own affairs with at least a reasonable degree of continuity. Adults thus not only welcome the vestigial stupor of their offspring, but encourage it in various ways and, under medical advice, do their best to perpetuate it. Very quickly the whole physiological economy of the growing organism adapts itself to this imposed rhythm, just as the metabolism of the drug addict adapts itself to his poison, and the sleep habit becomes fixed. In time it does not even require the original stimulus, whatever that may have been, but through the redintegrative mechanism becomes induced through a great variety of stimuli, such as approach of darkness, ringing of the curfew, being laid on the back, donning sleeping apparel, being rocked by the caretaker, or being pointed at by an impressive physician, who then calls himself a hypnotist.

What the "original" stimulus to sleep reactions may have been is, in the present state of our knowledge, largely a conjecture. It is not clear, for one thing, what that stimulus is in the case of the newborn child. Nor is it clear that, whatever this stimulus may be, it is identical with the primary sleep stimulus in the philogenetic history of the race. We do know that sleep may now be brought about by a great variety of stimuli or situations, which have, through the process of substitution, become connected with it. It is, moreover, important to note that what are ordinarily indicated as the immediate stimuli or justifications of sleep are usually instead actually its premonitory symptoms. That is to say, the difficulties of attention, loss of interest, forgetfulness, absent-mindedness, incoördination, and apathy, which are often said to "bring on" sleep, are instead the result of sleep, the signs of its beginning. The usual accounts are much like saying that the motion of a body is caused by its starting to move, or that an automobile accident was caused by the collision which constituted it, or that the heating of an object is produced by its rising temperature.

Our final point with respect to the satisfactoriness of the sleep theories concerns the mental experiences that we undergo as we fall asleep and as we awaken. We do not suddenly pass from alertness into stupor, nor from somnolence into the full waking state. Between the waking state and the sleep state there is an intermediate condition, the state of drowsiness, which deserves special attention. In passing from the waking state into sleep this condition is usually more conspicuous than in the process of awakening, although it is present in both cases. During a period which, depending on the individual, and on the circumstances of the occasion, ranges from a few minutes to a quarter or a half hour in length, curious changes in mental state are to be observed.

CHAPTER IV

THE PSYCHOLOGY OF DROWSINESS

> In considering any complex matter, we ought to examine every distinct ingredient in the composition, one by one; and reduce everything to the utmost simplicity; since the condition of our nature binds us to a strict law and very narrow limits. We ought afterwards to re-examine the principles by the effect of the composition, as well as the composition by that of the principles.
>
> EDMUND BURKE

THE SIGNIFICANCE OF DROWSINESS

Since our purposes are originated and our plans executed in our waking life, it is toward the active and clearly conscious mental processes that psychology has directed most of its attention. It is nevertheless true that popular curiosity is concerned with the stupor of sleep and with the vaguely conscious and evanescent experiences of the dream. But on the whole our knowledge of sleeping and dreaming is quite disproportionate to the amount of time we spend in these activities. Little is known about the mechanism of human sleep, and almost nothing about the sleep of other animals. Dreams have excited the wonder of the poets and the naïve and fantastic imaginations of the doctors. But most of the discussion of dreaming, even in our own time, displays an inadequate appreciation of the ordinary canons of reliable observation, evidence, and scientific procedure.

We shall here consider certain observations of a particular cross section of conscious life, a particular period in the daily life of all of us. This is that period, usually brief, which marks the transition between sleeping and waking life, and which may be indicated by such terms as "sleepiness," "dreaminess," or "drowsiness." This period has characteristics peculiar to it, which give its observation and analysis a special importance in the study of sleep and dreams in the proper sense. Its examination may also afford interesting insight into the thought processes of our ordinary waking hours.

This state of drowsiness, which usually precedes the sleep state, is especially prominent and long drawn out in conditions of overwork or unduly protracted waking hours. Much, of course, is known of the dreamy mental states so clearly described by Crichton-Brown and intimately related to the auræ which frequently precede epileptic seizures, and of the various disturbances of sensation and perception in neurasthenia, psychasthenia, and the many pronounced forms of alienation. Something is known also of the variously named hypnoid, hypnagogic, or presleeping state which is often found to precede the hypnotic trance, and of the dissociations found in hysteria.

The "dreamy mental states" described by Crichton-Brown in his Cavendish lecture were such experiences as "double consciousness . . . loss of personal identity . . . a going back to childhood . . . vivid return of an old dream . . . losing touch with the world . . . deprivation of corporeal substance . . . loss of sense of proportion . . . momentary black despair . . . being at the Day of Judgment," and so on. They are asserted to be "abnormal in their essence and morbid in their tendencies."

But references are few in the literature to the suggestive and quite common hallucinations and perceptual complications experienced by supposedly normal people in the state of drowsiness, and no careful description and analysis of this state seems to have been recorded by other writers. Prince has recently asserted that the presleeping state has "certain marked characteristics which distinguish it from the alert state of waking life and is worthy of study in itself." Maury, in the report of his experiments on dream production, describes the so-called "hypnagogic hallucinations" which he regarded as constituting "the chaos out of which the dream cosmos is evolved," and Herschel has described "sensorial visions" which occur during the waking state, but these seem to be merely the familiar entoptic phenomena of waking life. Sully called attention to the presence of transition states between sleeping and waking and to the comparative ease with which sense illusions occur in these states. These seem to be the "hypnagogic states" of Maury, "states of somnolence or sleepiness in which external impressions cease to act, the internal attention is relaxed, and the weird imagery of sleep begins to unfold itself." But Sully's chief emphasis is on the persistence of the dream hallucination proper into the postsomnial condition.

Conceivably the state of drowsiness might throw considerable light on dream formation, on the relation between the "latent" and the "manifest" content of dreams, and on the various ways in which external impressions and central dispositions are transformed and related in the serial dream. We have tried to show that this is the case. Careful observations of drowsiness make it possible to catch dreams in the making and to disclose the tendencies which, on the one hand, attain their free operation in the dream state proper, and, on the other, as we are now to indicate, influence, under adequate control, the thought processes of waking life.

Whether or not it be true that the genuine dream is experienced only in moments of waking from or falling into the sleep state is immaterial. The dream as a more or less systematic articulation and fabrication is quite distinguishable from the unique fusions which come in moments of drowsiness, and both these are distinguishable from alert perception. But the criteria of distinction are logical rather than psychological, practical rather than descriptive. In the experience of our observers the drowsiness episodes are more often momentary perceptual states, flashlights of imagery of unwonted vividness, and attitudes of distinct tendency, which may as such be reported in successive moments. But they do not tend to lead on to new situations as do dream states. And yet these perceptual fusions show striking points of similarity in their composition to the units of the dream and the acts of waking perception.

The experiences here recorded can hardly be classified as dream states, though it is true that only a little elaboration would be needed to make them develop into such states. They all occurred during waking moments, and frequently there is clear evidence that the observer is actively engaged in some waking employment of active thought process or is conscious of external events. Yet most of them are hallucinatory in character. Examination of such cases reveals several rather clearly defined principles of composition or general tendency. Chief among these are the following, the exposition of which seems to constitute a fairly true though perhaps only partially complete analysis of the state of drowsiness.

TRANSFORMATION OF IMAGERY TYPE

During our waking life we are able to "recall to the mind" objects and experiences which are not at the time present to our senses—the odor of a certain flower, the shape of some object, the voice of a friend, the rhythm and melody of a piece of music. We do this in some cases by means of mental images, which may belong to any of the senses. Most of us rely mainly upon one sense department in our daytime thinking; one of us tends to think usually in terms of visual images, another in terms of touch impressions, another in terms of sound. There is, that is to say, a dominant mode of imagery which each of us comes to adopt in his waking life, although we do not all adopt the same mode, and all of us can to some extent use all of the modes, and may do so in different circumstances.

During the drowsiness state the imagery type changes from this accustomed mode to the more unfamiliar sense departments. Imagery modes ordinarily vague and feeble become dominant and vivid. Thus one of my subjects, who is predominantly auditory and motor in type and can only with difficulty summon up visual images of even the most moderate vividness, has in the drowsy state visual experiences which constantly amaze him by their clearness. Another person, to whom sharp visual imagery is a common habit but who in her waking consciousness cannot understand what motor imagery is like, tends in the drowsy state to relive motor experiences almost exclusively.

Along with this emphasis of unusual modes goes the subordination of dominant modes so that in the drowsy state, as in dream life, images even of these unusual types seem to exceed in intensity the clearest images of the waking state. It seems to be generally true that with increased age, with increased preoccupation with books, and in general with practice in verbal modes of thinking, sense imagery gives way to word imagery of one kind or another. In drowsiness the condition of early childhood is reproduced and sense imagery may become vivid, intense, and grotesque.

The transformation of imagery type in drowsiness was first called to attention in a series of original observations by two experimental subjects. Since these observations were recorded, corroborative evidence has been found in the reports of several other investigators not especially interested in this problem. Thus G. E. Mueller, in reporting his studies of the memory consciousness, remarks:[1] "A further factor to be mentioned is the condition of fatigue of the observer. Thus my visual-motor observer (Jn) after material presented when in a fatigued condition, was more motor and less visual than at other times. . . . Similarly the pronounced visual observer, in a fatigued condition, when reciting material presented auditorially, depended more on holding the series by their sound."

In Titchener's striking analysis of his own imagery[2] is found another clear illustration of this transformation of imagery type. Although this observer says it is possible for him to "trust to the guidance of kinæsthesis," this mode of imagery does not seem to predominate in his daily waking life. The following statements show the apparent superiority of his visual and auditory imagery: "I rely in my thinking upon visual imagery. . . ." "My visual imagery, voluntarily aroused, is extremely vivid." ". . . visual imagery which is always at my disposal and which I can mould and direct at will." But he also has "vivid and persistent auditory imagery" and never sits down to work without a "musical accompaniment." Kinæsthesis seems to play a rather subordinate rôle, although we do find the remark, "As a rule I look to all three kinds of prompting in the course of a single hour." But, and this is the interesting point in the present connection, he says, ". . . *when I am tired* [italics mine] I find that vision and audition are likely to lapse, and I am left alone with kinæsthesis."

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[1] *Zur Analyse der Gedächtnistätigkeit und des Vorstellungsverlaufes,* 1911, I Teil, pp. 13, 14.

[2] *Experimental Psychology of the Thought Processes,* 1909, p. 9.

Consider also the following from the analysis of Henri Poincaré, by Toulouse.[3] "It is interesting to note that Poincaré reports the complete absence of visual images from his memory. They are replaced by motor images, especially those of the eyes and its accessories. Thus when he imagines himself sitting at the table at meal time, he does not see the table. He represents objects by those movements of eyes and hands which he is accustomed to make while eating." Poincaré, in waking life, is thus what we would call a motor-minded person. But consider now the account of his sleep.

"His sleep is not profound. The least noise awakens him. At the moment of falling asleep he has visual experiences which he is not always able to remember. The scenes, usually painful, which unfold themselves, are predominantly visual in character. The dumb characters are mobile and have a vivid visual intensity, quite as if they were real."

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[3] *Henri Poincaré,* pp. 51, 142.

So also the psychologist, T. H. Pear, writing of his own characteristics, has remarked:[4] "In waking life my auditory imagery is very scanty and far from clear. I am therefore interested in the fact that occasionally in dreams it is much clearer and more vivid, and plays a far more important part in my consciousness than when I am awake."

The most recent data on this "transformation of imagery type" in drowsiness are from a systematic attempt to study it, reported by Cason.[5] This investigator determined beforehand in various ways the customary imagery type of a group of people, and then had them record and report in detail all the "drowsiness hallucinations" experienced by them through a considerable period of time. The "drowsiness hallucinations" were then analyzed to determine the relative predominance of various forms of imagery contained in them.

This is the first attempt to put the transformation tendency into quantitative form. The investigation concludes that although the transformation of imagery type in drowsiness, from the data at hand, does not appear as a typical experience, and although no general rule or formula can be stated for it which will hold for all cases, the phenomenon often appears. There is often a very noticeable increase in the relative predominance of auditory imagery when passing from the waking into the drowsy state. There is, moreover, a slightly greater similarity between the imagery present in the waking and dream states than between that present in the waking and the drowsy states. As in all psychological characteristics, there seem to be marked individual differences in these respects. Thus, in spite of the difficulties of quantitative formulation of such data, the results of this investigation accord in general with the findings of the previous more incidental observations.

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[4] *Remembering and Forgetting,* 1922, p. 153.

[5] "Imagery in the Waking and Drowsy States," *American Journal of Psychology,* October, 1923.

Many people complain that with maturity they lose their long-drawn-out delight in books, and especially in descriptive literature. They tend more and more merely to scan such passages and hence to read books much more rapidly. They may regret the loss of the old source of satisfaction, the character of which they usually do not clearly understand. Evidently what happens is that sense imagery is waning and description no longer has its old power of awakening interest or calling forth emotion. In drowsiness this state tends to disappear. The dominant modes in which one has become accustomed to think, in the more vigorous sense, seems to tend toward sleep more quickly, while the less used centers remain active or go to sleep more slowly.

This tendency, along with the absence of sensory stimulation, probably accounts as well for the greater vividness of images in dreams. The frequency and character of dream imagery has sometimes been taken as an index of the type habits of waking life, but the transformation tendency shown in the observations here presented seems to show clearly that this is not the case in the state of drowsiness. The difference may, perhaps, be explained by supposing that in sleep all the centers are more nearly equally quiescent, whereas in drowsiness the type centers slumber first, thus giving prominence to modes not usually relied on.

Two samples will illustrate this process of imagery transformation. They are both reported by a subject who does not have visual imagery in his waking life, and it will be seen that these experiences, reported during a drowsy state and recorded before going into deep sleep, are exclusively visual.

(*a*) Lying in bed talking and feeling drowsy. In a pause I see a large marble toad-stool, clear and white, which seems to stand on a hill and to resemble the dome of the New York University Library, around which runs the Hall of Fame. On top of the toad-stool were stamped in large black letters three names, Jastrow, Gillis, and another one which I could not make out. At once I told my companion of the vision, saying "I see a curious Hall of Fame," etc. That evening I had read some comments on Jastrow's magazine article on "Malicious Animal Magnetism," and had also seen in a comic paper a picture called "The Annual Ball of the Mushrooms." Analysis threw no light on the name Gillis nor on the blurred name.

(*b*) At Victor Herbert's Opening Concert we were talking of the cartoons of Mr. Bug in *Life*. A companion described a cartoon in which the six legs of Deacon Fire-Fly were represented as grasping different objects such as a Bible, a prayer book, etc., while Mr. Bug held playing cards, a bottle, a cigar, etc. I had been working all day on comparative nervous anatomy, preparing a lecture on complications of stimulus and response, and my head was full of segments and nervous arcs. The orchestra played Grieg's "Wedding Day at Hegstad." In the last bar there were three finishing blasts with full orchestra. I had become very drowsy, and these blasts seemed to me to be the movements of a huge bug which came sailing from behind the stage wings, suddenly alighting on the platform, first on the two hind legs, then bringing down the middle pair, and finally the front feet with the final blast. The visual elements present were of huge, vague, rather reddish brown jointed legs, the feet not clear, and only the lower ventral side of the body dimly suggested, but flashing out at each "land" of the feet.

Any explanation of this striking transformation of imagery type during the drowsiness period will, in the present state of our knowledge, be hypothetical only. We may suppose, for example, that the transformation means that the types of imagery most employed in waking life and the brain mechanisms underlying them tend toward sleep more rapidly or more profoundly than do those processes that have been exercised to a less degree. This would mean that at a point in the drowsiness experience when typical and customary types of imagery were quite inactive, the less accustomed modes might still be in a lively state. Their actual liveliness might be no greater than in the usual experience of waking life, but in contrast with the now benumbed accustomed types, such images would seem vivid and intense. On this basis the last images to succumb to the sleep stupor might be expected to be those which were least used in waking life.

One investigator has reported observations in the field of motor reactions that seem analagous to this shift of imagery from the accustomed to the more unusual type. This observer reports that during deep sleep right-handed persons become left-handed and vice versa. When the face is tickled with a feather, the right-handed person is said to make movements with the left hand, as if he would brush away a fly. The left-handed person, on the other hand, makes such protective reactions with the right hand. If these observations should be substantiated, we might apply to them the same explanation as that we have just suggested for the transformation of imagery. But a second investigator, repeating these experiments, reports that he cannot verify them and that the sleeper reacts as does the waking person, following the established laws of reflex action.

Rivers, in describing certain dream experiences characteristic of the drowsiness period (in this case usually the prewaking drowsiness), has also recently reported "a striking difference between my dream-personality and the personality of my ordinary life. In my dreams I am a visualizer; I also often have perfectly definite auditory imagery, and less frequently imagery of other kinds, such as of taste and smell. In my ordinary life, on the other hand, I rarely experience imagery, and then usually in so fugitive and vague a form that if my attention had not been attracted to the subject through my scientific interests, I should doubtless never have noticed such capacity for imagery as I possess."

Rivers supposed the contrast to be between having imagery and not having it. Furthermore, he inclined to explain the imagery of drowsiness as a regression, under the weakness of oncoming sleep, to "an infantile process which is not at my disposal in my ordinary waking life," because of "certain restraining or repressing influences whereby the power of imagery is kept in abeyance." This concept of "repression" has played a large rôle in modern psychoanalytic speculations, the rampant freedom of which is far from being illustrated in the mild and tentative suggestions put forth by Rivers.

The fact seems to be that with Rivers, also, drowsiness was accompanied by a transformation of imagery type, a shift from the verbal and motor cues to the visual and auditory cues. The latter had not been "repressed," but merely discarded, abandoned in his adult thinking. So long as "discarded" describes the observations, the figurative but undoubtedly more interesting concept of "repression" need never be invoked. Things may easily enough be neglected for a time, and subsequently brought again into use (one's old shoes are a good example) without assuming such a mysterious mechanism as "repression." And if one insist on a mechanism, "drainage" or "substitution" is surely a more intelligible one than "repression." The all too ready substitution of the term "infantile" for the observed "simplicity" or "crudity" is another instance of the introduction of unjustifiable implication into observed data.

In certain quarters contemporary discussion has manifested an obsessional tendency to identify the simple with the infantile, for no good reason. Suppose, for example, that children do have vivid imagery, experienced by adults only when drowsy. It is then surely just as sensible to describe the child's experience as being "drowsy" as it is to characterize the adult's experience as "infantile." Only a prejudiced intention can insist on letting the trait of childhood determine the vocabulary of description. The "infantilism" of the Freudians and their followers turns out, under examination, to be either only a metaphor or else merely an adult term of disapproval and deprecation. Based as it is on such a whimsically chosen vocabulary, the whole concept of "regression" turns out to afford not a set of explanatory concepts but only a set of picturesque adjectives.

SENSORY, PERSEVERATIVE, AND IDEAL SUBSTITUTION

Within the content of the drowsiness fusion or hallucination, a present impression, a perseverative tendency, or even a pure memory element often substitutes itself for some other datum, whose rôle it fills in the perceived composition of the hallucination. The various types of substitution or the varieties of surrogate are interesting because, however different their origin, they are all capable of assuming a vicarious or substitute rôle. We may distinguish at least three types on the basis of the available examples, namely, sensory, perseverative and ideal substitution.

Sensory Substitution.—In this case a present sensory impression takes upon itself the task of impersonating or representing some other object, bearing its qualities, carrying out its behavior, and in general acting for it or *meaning* it. The following example represents a case of sensory substitution:

On board an ocean liner, dressing for dinner in a suit purchased abroad, sitting drowsily on the edge of the berth and thinking that the suit had turned out to be a bad investment and had been forced upon me by a tricky salesman. Planning to buy cloth next time, to be made up in America, and wondering if it would pass the Customs. Suddenly the rush of water, heard through the port-holes, becomes transformed into the husky voice of the salesman trying to sell me the suit, and repeating his previous conversation. I fall to musing in the process, wondering, while he talks, at his husky voice and why he has no more inflection. Coming to, at the sound of the dinner bell, I still hear the husky, monotonous swish of the water, and realise that this is all. The incoming sensory impression had substituted itself for the memory content, in my reflection.

Perseverative Substitution.—This is illustrated by the following example in which the thinking out of an experimental problem seemed to be carried on in terms of the manipulation of perseverating impressions hanging over from the occupation of preceding hours:

> Played checkers nearly all day on the steamer. Retiring to my cabin before sleeping time, threw myself drowsily on the bunk and fell to ruminating on some projected experiments, wondering whether to follow the "order of merit" method, or a method of assigning numerical grade to each object in the investigation. I decide, but in my half-awake consciousness the decision takes the form of a move in checkers —I decide to move my white man up to the king row, and mentally see my opponent jump it with his black man. Here it was not an incoming impression but instead a perseverating content that substituted itself for another item in my thinking.

Ideal Substitution.—In this case an ordinary revived image or a memory or a relational feature becomes the substantive for experiences more or less remote, or assists in the interpretation of a present situation. This type of substitution is more difficult to demonstrate, for two reasons. In the first place, it is not easy to draw the line between perseverating impressions and supposedly revived images. Thus, in the "Herbert Concert" illustration, given on page 51, the huge bug which was conceived as alighting on the platform as part of the apperception of the three successive orchestra blasts, was evidently a pure object of "creative imagination." No previous impression had corresponded to such a creature of such dimensions. Yet the character of this imagery content was probably determined by certain perseverating tendencies arising from the prolonged consideration of types of nervous anatomy.

In the second place, substitution of the sensory and perseverative types usually involves a correlative displacement of the ideal content for which they act. In setting up ideal substitution as a third type we may then sometimes be merely paraphrasing the other types. However, there are observations which show clearly that even relational aspects of present impressions may be substituted for different relations, subsisting between other objects. In a later connection the importance of this fact for the psychology of thinking will be emphasized.

For rough descriptive purposes the phenomenon we have here called "substitution" might instead be indicated by the simpler term "confusion." Situations, objects, and facts, having some element or feature in common, are confused one with another, much as children mistakenly identify objects possessing some common element. But to rest content with this level of analysis is quite to underestimate the meaningful aspect of mental processes.

Not only are situations and events "confused"; they also, as a result of this confusion, take the place of one another in the forward movement of association and action that constitutes thought. The process is less like the confused perception of children than it is like the adult use of figures of speech—of metaphor, of synecdoche, and metonymy. In figurative speech and writing there is also a "confusion" of things having some element in common; but the important thing about figurative language is not the mere confusion but, instead, the actual substitutive rôle played by objects and events. In a later connection, when we consider the psychology of "meaning," we shall be able to see more clearly how important this "substitutional" rôle is in all acts of thought, as well as in the ordinary dream.

It is easy to see how these two dispositions, the transformation of imagery type and the tendency to substitution, combine to give bizarre and confused pictures and thoughts which have a hallucinatory character. They are the beginnings of dreams. In fact we shall later see that these experiences, along with others now to be described, form the basis and explanation of all dreams, and throw much light on the thinking processes of waking hours as well.

FEELINGS OF VASTNESS AND GRANDEUR

The third characteristic of the drowsy state is the disposition to feelings of vastness and grandeur. Experiences of a sensory or perceptual sort seem magnified and immense, as a rule, in this condition. Thus the idea of a gigantic insect and the personification of monotonous noises show this tendency to magnify simple impressions. To the drowsy mind the finger, hand, or head often seems to swell to enormous dimensions; one's foot seems to weigh a ton and to occupy the whole bed. In one case a space of perhaps three feet between two sleepers was taken to represent the ocean. Movements of the body may be similarly magnified. Thus one observer reports:

> In bed, during the winter, with the grippe. Drowsy but not sleeping. Kept tossing from side to back, then to the other side. As I tossed in this way, I seemed to be going to Brooklyn and back, Mrs. M——— who lives there having been uppermost in mind through conversation, letters, and a recent visit.

This exaggeration of drowsy experiences is to be explained, in part at least, on psychological grounds. In the first place, the process of substitution seems often to be merely a device of economy. So long as a present sensory impression (as the sound of swishing water) will function for a more imposing object (as the voice of the salesman) the development of a "memory" symbol for this object is unnecessary, and it is an act of economy to abandon it. But the trivial sensory impression is thus freighted with a significance uncommon to it. It is, through the act of substitution, exaggerated and its rôle made more impressive. To this is perhaps due much of the reported magnification of drowsy episodes. The tossing movements of the sleeper from side to side come to function for journeys to and fro over larger spaces, and this very substitution constitutes a spatial magnification. In general it seems to be a rule of substitution that the trivial is substituted for the important, the small for the stupendous, the part for the whole. This is indeed the very essence of symbolism of all kinds. So also, in the history of currency, bullion is substituted for merchandise, coins for bullion, paper money for coins, and credit or checks for paper money.

It may also be that, especially in the case of sensory impressions, magnification is due to the lower or fainter background or level of stimuli from which the impressions emerge. Since, in general, sleep accompanies retreat from the ordinary press of stimulation, or adaptation to it, the apparent intensity of any chance impression is increased through its unusual contrast with this low level or faint background of comparison. All perceptions of magnitude are much influenced by this law of relativity, and it would be strange if the drowsiness episodes were an exception to the rule.

SUPERFICIAL AND UNCONTROLLED ASSOCIATIONS

A fourth characteristic of the drowsy state is the tendency of ideas and thoughts to be associated with one another on the basis of superficial resemblances and trivial analogies. Associations tend to be loose and fluid and more or less on a simple sensory basis, with removal of constraining mental sets and controls. This leads to bizarre analogies, novel figures of speech, naïve statements, and unusual verbal combinations. Not infrequently similes and affective chords are hit upon, which, with only a little treatment, would become adequate and interesting figures of speech.

In this respect the state of drowsiness seems to be quite like the genuine dream consciousness in which such free associative tendencies are pronounced. Thus De Manaceine points out "the tendency which compels us during sleep and during enfeebled states of consciousness generally to associate everything which presents some common resemblance, for example—words according to their sound, and images according to some accidental and external resemblance. The same tendency is observed in the uneducated and very markedly in the insane. . . . Any resemblance in color or form is enough to associate images which are altogether heterogeneous." And again, "There is a well-known tendency in dreams for the perpetration of bad puns, sound leading sense, as happens frequently with the insane, idiots and young children." Prince, in referring incidentally to the characteristics of the presleeping state, has written: "Ideas course through the mind in what appears to be a disconnected fashion, although probably determined by associations. Memories of the preceding day and of past thoughts which express the interests, fears and anxieties of the psychological life, and attitudes of the individual, float in a stream through the mind like a phantasmagoria."

A few simple examples will serve to illustrate these loose association tendencies. Here is a brief conversation observed during a drowsy state:

> *A* remarks to *B,* "Let's hurry and get there by ten o'clock."
> *B* replies drowsily, "Oh, that's easy. I could get there by a nickel to ten."

It was then 9:50, and the superficial resemblance between a stretch of time and a piece of money (each containing five conventional units) led to the rather novel association and substitution.

In Stevenson's letters to Henry James there occurs a statement concerning the "Henry James chair," followed by other remarks. This chair was apparently one in which James had sat when he visited the Stevensons. Stevenson writes:

> It has been consecrated to guests by your approval, and now stands at my elbow, gaping. We have a new room, too, to introduce to you—our last baby, the drawing room. It never cries and it has cut its teeth. Likewise there is a cat now.

This bizarre set of figures and metaphors must have been written late at night and in a state of drowsiness. In fact, Stevenson says earlier in the letter, "my wife being at a concert and a story being done," indicating a late hour and, in Stevenson's case, fatigue.

Many of the choicest paragraphs to be found in the works of the imaginative writers bear all the birthmarks of a drowsiness conception. Consider, for example, the following simile from Balzac: "He saw his teeth departing one by one, like brilliantly dressed ladies from a ball room." This is clearly the substitutional thinking of a drowsy man.

Under the influence of fatigue and drowsiness one college instructor requested the street-car conductor to let her off "at page thirty-four." Another once drowsily remarked that it is difficult to find good trade names for new brands of oil, since the good names are all registered, "even though no such oil has ever been published."

Studies of the working habits and preferred hours of work of literary men show that essayists, historians, and others who deal with sober fact prefer in general the daytime hours. Poets, novelists, journalists, and imaginative writers in general show a stronger inclination toward night hours. In the light of the associative tendencies here noted, it is not difficult to see why the imaginative writer who may be in need of striking analogy, novel combinations, and fresh figures and metaphors should prefer the hours of drowsiness. Here, perhaps, is the psychology of the midnight oil.

The artist and the poet must in some way get out of the world of conventional percepts and into the world of sensory qualities. This is not an easy thing to do. Most of us were there when we were children, and the most prosaic of us tend to slip over the frontier in the presleeping state, or when, under the influence of certain drugs, we are in an artificially induced state of drowsiness. De Quincey resorted to opium, and Mark Twain, it is said, did most of his writing in bed or lying on the floor. But the frontier is a formidable barrier. A very few of us are vagabonds enough to be able to wander back and forth at will, and these are the artists and the poets.

ISOLATION OF THOUGHT TRAINS

Closely related to the uncontrolled associations of the presleeping state is the tendency for longer trains of thought to develop without being checked up by the data and known facts from outside their own immediate sphere. Trains of thought develop in independence of one another. An idea, plan, or desire is thus able to make unimpeded progress from stage to stage of its development with what seems at the time to be unerring logic. It is this lack of restraint that has made it appear to some observers that unimpeded wish fulfillment was the chief characteristic of the dream experience. Cosmic riddles are solved and impossible mechanical devices are planned.

There is an old story of a man who had so many of these wonderful ideas on going to sleep that he determined to write the next one down and thus preserve it for examination in the morning. When morning came he looked eagerly for the paper on which he had recorded the profound observation that had occurred to him during that night. He read there only the single mystic sentence, "A strong smell of turpentine pervades the whole," a sentence which after all did not seem to solve any cosmic riddles. Another man, in a drowsy moment, felt that a highly significant series of events which he had been reviewing had been neatly summarized in a single pregnant sentence. This sentence was repeated so as to be remembered in the waking state. It was then seen to be the following nugget of thought: "Drummond made it flapsticks, but Peter made it saints."

The writer has frequently recorded fantastic experiments and conclusions developed either alone or during discussions late at night. These feverish plans, insights, and conclusions, developed in midnight hours, have almost invariably faded into pale grays on the arrival of the next "waking consciousness," much as did Maeterlinck's Bluebird when brought into the sunlight. The most striking thing about these plans has been their splendor as works of unbridled imagination but their absurdity as scientific achievements. The arguments are found to abound with fallacies or the experimental procedure with sources of error that were lightly bridged over the night before. It is much like the nocturnal aëronautic inspection of a line of march which must be gone over on foot when daylight comes. It is not difficult to see why men who must think and write soberly prefer the daylight hours.

This characteristic of drowsy states is closely related to that described in the foregoing section. The difference lies in the fact that there we were dealing with single perceptual or ideational contents, while here we have to do with such serial chains of associations as may sometimes be set up under the guidance of a problem. In the drowsy state proper, these chains do not develop, the genuine drowsiness complication being either a simple "flashlight" hallucination or else a sort of "boomerang" composition, tending to return always upon itself rather than to lead on to further and new associations.

Fantastic thought systems evolve most easily in times of fatigue, loss of sleep, unduly prolonged intellectual work, or other dissociated states. When the drowsy state is thus extended over a long period of time, association chains and reasoning show much the same behavior that perceptual and simple ideational states do in drowsiness of the ordinary type. The essential thing is the release of intellectual inhibition. Thought is accompanied by the strong emotion and the feelings of exuberance, buoyancy, confidence, and eager enthusiasm characteristic of the night worker.

Among the marked characteristics of constructive efforts undertaken during drowsiness is, naturally enough, as we have seen, the prominence of analogy or other figure of speech. Such thinking is clearly facilitated by the ease with which the end terms of a relation become shifted through the process of substitution to incidental and associated items. The "relations" abide, but rest upon shifting piers. Such thinking usually discloses its drowsiness origin in the language of its expression and in the logic of its argument. One of the most interesting illustrations of this fact is the case of the British psychologist, Rivers, whose later work is strikingly based upon the unusually effective use of analogy, even in his discussion of physiological topics. And Rivers has written of his own method of work, "Many of the scientific ideas which I value most, as well as the language in which they are expressed, have come to me in this half-sleeping, half-waking state, directly continuous with sleep."

SUGGESTIBILITY

A sixth characteristic of drowsiness follows more or less directly upon the preceding one, except that it refers to conduct as well as to thought. This is the extreme suggestibility of the presleeping state. Just as thought and ideas are uncritically developed, so suggestions given by another with whom the individual is in cordial relations or in whom he has confidence tend to be uncritically accepted and acted upon. The drowsy man, going out into the sunshine of a clear day, is likely to raise his umbrella if he finds it in his hand. The drowsy child will confidently follow instructions which he might resist in his waking hours.

Physicians who practice psychotherapy take advantage of this fact by putting their patients into a presleeping or drowsy state, and then proceeding with suggestions as to their conduct, their symptoms, and their feelings. In order to make the treatment seem worth the fee that is charged and to enhance the prestige of the physician, the patient is mystified by being told that this is hypnotism, and an impressive arrangement of lights, odors, sofas, and curious instruments is introduced into the game. But the success of the treatment, when this is present, is due simply to the suggestibility of the drowsy state. What we mean by suggestibility will be shown in another way when we come to speak of the dissociation of the nervous system.

CATALEPTIC ATTITUDES

Several further characteristics of the state of drowsiness are to be indicated. The first of these is a tendency toward cataleptic attitudes. Lift the arm of a man in a waking state and when you let it go he will put it back or it will fall of its own accord. Put the waking infant into an unusual, uncomfortable, or grotesque posture, and, as soon as you take hands off, the limbs are brought back into a comfortable and sensible position. But during this drowsy period, the hypnoidal or hypnagogic period, as it has sometimes been called in order to make it seem more mysterious, the limbs retain for some time, often for a long time, any position in which they are placed, and having been put into position may show a certain resistance if you seek to change them. This is what is meant by catalepsy. A puppy, put into this hypnoidal or drowsy state, may be hung dangling over the edge of a box, without trying to recover himself. A frog, put into this state, may be hung over the edge of a glass jar, with the forelegs dangling outside and the hind legs hanging down inside the jar, and he will remain in this position for an unexpected time, although in the waking state no frog would continue in this posture.

These postural fixations have been variously explained. Perhaps the most suggestive notion proposed is that the sensorimotor nervous tracts involved in assuming a given posture become organized into a relatively isolated pattern, so that incoming sensory impulses from the contracting muscles discharge directly into the motor pathways leading to those same muscles. Thus these impulses serve as the stimulus to further contraction, which produces fresh sensory impulses, and so on, in a kind of perpetual round of activity. The posture itself is thus the stimulus to its own maintenance, although in waking life the intrusion of outside influences would serve to break up such a fixation.

RAPIDLY DEVELOPING AMNESIA

Furthermore it is to be pointed out that drowsiness is characterized by amnesia, that is, by forgetfulness. Processes and events occurring during the drowsy state are quickly forgotten, and they escape being reported unless special interest invites attention to them and they are promptly recorded. Unless they are recorded or reported promptly they are soon forgotten or else they are elaborated by the retrospective attempts of the waking consciousness. All of us have been chagrined by starting to relate an interesting dream of the preceding night, only to find that the varied and rich array of details have all disappeared and what remains in memory is but a sketchy skeleton or disjointed fragments, lacking both in interest and in action.

In this respect the experiences of the drowsy and the dreamy states resemble those events of our waking life that are only incidentally regarded—observed, as it were, in the margin or fringe of attention. Such incidental observations are not closely associated with other experiences of the moment, and hence they are not readily recalled; that is, they tend to be forgotten. In a familiar experiment a person is told that he will soon be shown, for only a second or two, a card on which certain letters are printed. He is asked to observe what the letters are and to note their number. Thereupon there is exhibited a square of yellow cardboard, bearing a number of red letters in a particular arrangement, surrounded by a green border. Then, to his surprise, the witness is asked not only about the identity and number of the letters, but also about their color, their arrangement, their size, or about the color of the background and the nature of the border.

These latter things he had seen, just as truly as he had seen the letters, but he had observed them only incidentally, in the margin of attention. Details not attended to do not become strongly linked up with the rest of the elements and hence are not easily recalled. Some hours later, however, in a moment of abstraction or relaxation, it is not unusual for the witness to find in his mind's eye the perseverating image of a yellow square and perhaps of a green border, the origin of which he may recall only with difficulty.

Drowsiness events behave in the same way. Although forgotten upon awakening, they may haunt the mind during subsequent waking hours, being not easily distinguished from the perseverating items of incidental observation. This frequently leads to a confusion of dream experiences with those of waking life.

One day I found myself haunted by a perseverating visual image of a bit of woodland. Standing out vividly in the foreground were the trunks of two tall trees, and between them hung the stout ropes of a child's swing. There was a vague suggestion of foliage and grass, and the whole scene appeared to be a secluded corner of a landscape. For a long time I puzzled over this picture, trying to recall the rest of the dream. The image seemed to me to be a fragment of some larger context, and in all ways to resemble my usual patchy dream memories.

Suddenly, after I had given up the effort and gone out into the garden, there flashed into my mind the memory of the grounds of the Teachers College Country Club at Scarborough, which I had visited for the first time the day before. There I found the haunting tree trunks and swing, and I was able to remember having seen this precise object in a remote corner of the landscape as I had glanced quickly about the grounds before going into the house. It was not a dream fragment at all.

REDINTEGRATIVE PATTERNS

These perceptual complications and their relation to the perseverating tendencies, taken along with what we have already described as the tendency to "substitution," justify the special designation of "redintegration" as characterizing the drowsy state or experience. Part of a complex stimulus, occurring by itself or in some new context, provokes a complete perceptual reaction such as was previously made to the total situation in which this stimulating detail was a part. Such a process is common in primitive thinking, in infantile learning, in conditions of exhaustion and fatigue, in states of distraction, and in such nervous disorders as hysteria.

It is also clearly characteristic of the drowsy state, as the foregoing illustrations indicate. In the hallucination of the huge bug alighting on the stage, it was the trivial numerical relation or attribute of threeness that seemed to constitute the stimulating detail. This detail originated in the musical sounds, but the perceptual reaction was a redintegrative pattern of perseverating images, in which threeness was also conspicuous. There were three blasts, there are three levels of the nervous system, an insect has three pairs of legs.

In the case of an observer whose drowsy consciousness was filled with the work of handling the seams on a garment, the kinæsthetic and static stimuli involved in tossing from side to side kept active a cortical pattern that was already in a state of preparedness, and the dreamy experience consisted of the arousal and perpetuation of this redintegrated pattern—the thought of opposing seams on a garment.

Perseveration of a pattern thus means tendency of the whole brain to act according to that pattern rather than to another. Any stimulus will thus tend to set up this reaction pattern, especially if the stimulus coincide with some detail of the perseverating structure. Or one perseverating pattern may tend to reinstate another pattern having some elements in common with it. One perseverating pattern may thus redintegrate another.

It is extremely likely that such appearance of symbolism as may be discerned in the drowsy states comes from this substitutive redintegration of perseverating patterns. And it is furthermore entirely probable that such symbolism as is shown in the more fully developed dreams is only a more complex form of the same process.

By way of summarizing this descriptive portion of our topic, we may say that the drowsiness hallucination seems to be a "flashlight" perceptual fusion or complication, and is further characterized by transformation of imagery type; by sensory, perseverative, and ideal substitution; by fluid association, chiefly on a sensory or superficial basis, and by isolation of associative trains when they develop. It is accompanied by tendencies toward vastness and grandeur; by rapidly developing amnesia; and by absence of special symbolism. The combination of several of these characteristics leads to that special form of perceptual reaction which we have called "redintegration."

CHAPTER V

THE CONCEPT OF DISSOCIATION

> By looking into physical causes our minds are opened and enlarged; and in this pursuit whether we take or whether we lose our game, the chase is certainly of service. . . . In reality the subject requires a much closer attention than we dare claim from our manner of treating it.
>
> EDMUND BURKE

REFERENCE TO CORRELATED PHENOMENA AS EXPLANATION

Any explanation of sleep that is to be adequate must accord with these facts of drowsiness, as well as with the previously given series of facts relating to the behavior of a sleeper. The experiences of drowsiness have the characteristic that commonly invites the use of the word "subjective." They are directly reportable only by the individual who "has" them. The more overt phenomena of the sleep state, consisting chiefly of the behavior of the sleeper as a visual-auditory object known to other observers, would conventionally be called "objective" occurrences. Among these objective occurrences would belong the observed or inferred changes in the sleeper's body.

The explanation of sleep may therefore be concerned with either of two sets of events—the "introspectively observed" events of the sleeper's "mental life" or the socially inspected events constituting the life of his organism. It is the contemporary fashion in psychology to state that the former series "depends on" the latter, so that if the organic events be established in causal sequence the sequence of the subjective facts is supposed thereby to be made intelligible also.

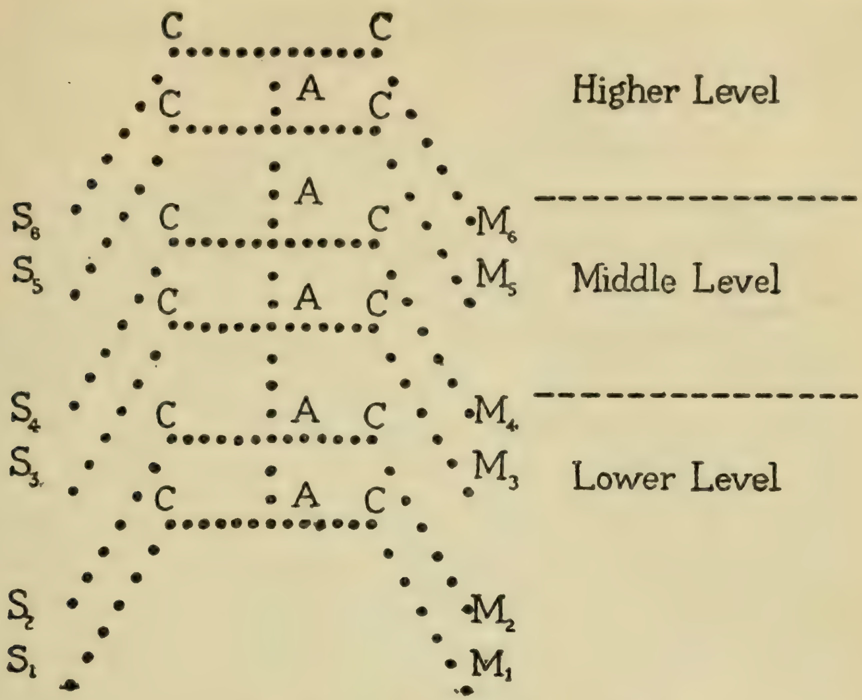
At a later time we shall have occasion to consider the logic and implications of this method of "psychophysical parallelism." But for the present we can only conform to current practice and look for some fact or concept that will explain the sleeper's objective acts. It may then be suggestive to extend the concept to those subjective events known only to the sleeper. The physical events most referred to by this physiological type of psychology are the changes in the nervous system. A close correlation is established between the nervous events accessible-to-the-many and the subjective events known-only-to-the-one. Hence reference to the correlated system of facts is a common mode of explanation.

NERVOUS ARCHITECTURE AND INTEGRATION

A reasonable combination of suggestions may be found if we consider the way in which the nervous system is built up. It is composed of neurones or nerve cells, each neurone being a separate element with its cell body and two sorts of branches, the dendrites and axones. Two or more of these neurones make up an arc or pathway or pattern. Thus the long axone of a sensory neurone leads out to a sense organ—the eye, the ear, the finger tip. The short branches or dendrites of this cell run into the central nervous system to connect with the short branches of another neurone, which sends its long axone out to a muscle or gland, or connects with other neurones. Thus, when the foot is pinched, the energy change stirred up in the sensory nerve passes inward through the two neurones and out to a muscle in the leg. The muscle contracts and thus the foot is withdrawn. This is a protective reflex, a simple nervous arc or pattern of the lowest level.

Now the nervous system as a whole is built up of such arcs or patterns as functional units. These patterns are in turn so associated and linked up with one another that the whole forms an integrated system which is the physical correlate of the unity of our personality. It is customary to distinguish three levels in this system—the lower, middle, and higher levels. On the low level are the simple protective reflexes such as that just described. Arcs of the second level are more complicated. The incoming nervous impulse does not at once pass out into a motor pathway, but is in part distributed up and down the spinal cord and into the outlying sympathetic or autonomic system. This gives, instead of a simple or localized movement, a more complex response, involving a larger part of the organism and including perhaps the internal organs—the glands, the heart and diaphragm, the blood vessels, and the digestive tract. Such a response is the physical correlate of our emotions. Arcs of the higher level are in the brain itself, in part. If the nervous impulse extends this far through the system, memories of past experience may be aroused, and the response is modified by reflection, judgment, and thought. Into the nature of these processes we shall later have to inquire in some detail. A schematic picture of such an integrated system would be something like the following.

In this diagram the lines marked *S* indicate incoming sensory pathways and those marked *M* indicate outgoing motor channels. The lines marked *C* indicate the central



neurones connecting these two paths. The lines marked *A* represent the association neurones, which bind together the various arcs and levels into a unitary system. In the waking and normal or fully integrated individual these various arcs are in functional communication with each other. What happens as the result of an impulse over S_1 depends not only on openness of the path to M_1, but also on what is happening at S_2, S_3, etc. Thus the pinch on the foot (S_1) may not produce a movement of withdrawal if over S_2 there comes another impulse leading to M_2 and tending to produce an extension instead of a flexion of the leg. What will happen will depend on which of the two impulses is stronger, which of the paths is the more open, and whether another impulse from S_3 or S_4 reinforces one or the other of these primary tendencies. How the integrated organism reacts depends then on the total situation at the moment, including the past experience and habits of the individual.

PHENOMENA OF DISSOCIATION

But there are many occasions in which the integration is imperfect. One arc or pattern may be temporarily or even permanently split off from the rest of the system, leading an independent life of its own, beyond control of the system as a whole. This condition is known as *dissociation.* For example, because of some need, I may wish to recall the name of a man whom I once met, and to speak it. But I find that I cannot recall the name. Still I am certain that I know it; I have forgotten it only for the moment. If the man should appear before me as a sensory stimulus, the name may immediately come and be spoken. The arc involved is then intact, but it is split off from the arcs above it. Forgetting, then, at least temporary forgetting and perhaps also permanent forgetting, is a case of dissociation.

Simple habits when they become automatic and take care of themselves also represent arcs which have become more or less independent. Thus the sight of the finger nail may lead at once to the act of putting it to the teeth and biting it, quite regardless of warnings, punishments, or purposes which involve other arcs. The naïve acts of the absent-minded man represent direct responses to stimuli, not checked up and corrected by what is happening on other arcs. The feel of the umbrella handle leads to opening it and carrying it out into the street on a clear and rainless day, quite oblivious to the grins and sly remarks of passers-by. The absent-minded act is a dissociated performance.

The somnambulist who walks in his sleep without hearing words spoken to him, and yet avoids objects encountered in his path, is also carrying on a dissociated activity. So also is the person who writes automatic writing on the planchette, who moves the Ouija board and tips the table at an honest séance. In people with marked hysterical traits, that is, with unusual dissociative tendencies, large portions of the system may be thus split off, leading independent existence. Such acts seem foreign to the main personality and are said by the patient or medium to be the work of spirits, of controls, and the like. When the two or more dissociated sections of the system are very large and comprehensive and each is, within itself, fairly well organized, the condition is so bewildering and curious that it is called a state of dual or multiple or partial personality.

The reader may by this time have formulated the suggestion toward which this exposition is leading; namely, that sleep is a condition of profound and widespread dissociation, which begins with the association paths and, spreading to the central neurones, works downward from the higher level toward the lower, but never completely involving the whole system.

NATURE OF SLEEP RECONSIDERED

Let us see how such a process would affect our activities. The failure of the links marked *A* in our diagram would leave the separate arcs or patterns intact but unrelated and exercising no influence on one another. This gives the state of extreme and uncritical suggestibility, the tendency to maintain unchanged the postures impressed upon or suggested to the body (catalepsy), the naïve acceptance and overevaluation of impressions and ideas, the free development of isolated trains of thought, unimpeded by considerations of logic or by the contributions ordinarily afforded by other patterns and experiences. It explains the marked amnesia or forgetfulness, since remembering means recalling and recall depends upon the linking of one set of ideas with another set, by means of the associative mechanisms. This first stage of dissociation thus gives us the picture of drowsiness in all its characteristics.

The dissociation continues, affecting next the central neurones, which connect sensory with motor and central channels. An impulse over S_4 no longer produces a response over M_4; the sleeper is deaf, and when called by name does not turn his head in the direction from which the sound comes. Similarly, he is blind, and generally anæsthetic to ordinary stimuli. If the stimulus is sufficiently intense or vigorous or abrupt, it may of course by its vigor create an impulse which will overcome the resistance or leap the gap which is responsible for the dissociated state, and the sleeper awakens. Moreover, the arcs and patterns of the lower level, the protective reflexes, and the automatic patterns controlling vital organs such as the heart and diaphragm, seem not to take part in this dissociation at all, they remain active and alert, and even stimuli which are not heard, seen, or felt by the sleeper, nevertheless produce reactions along these lower reflexes.

We must add to this account the further condition that the process of dissociation, as we have described it, is not a passive and mechanically produced change. Instead it must be described as an active adjustment of an instinctive kind. Instinctive responses, such as fear, curiosity, hunger, sex, although they are inherited tendencies and do not require to be learned, are nevertheless subject to modification and control. They are under the influence of thoughts, wishes, and purposes, and under these influences they may be limited, restricted, directed, just as we have seen in the case of sleep.

Sleep, we have seen, does not involve the whole organism; it can be, within limits, delayed at will, interrupted or terminated at any point; and it may involve the continued alertness of certain selected responses or patterns. All of these facts seem consistent with the description of sleep as an instinctive dissociation working from the upper level downward, never becoming so complete as to involve the vital organs, and even within the upper level being subject to wishes, purposes, and special determinations. Special purposes and patterns may perseverate, may remain active while the rest of the brain sleeps. If, however, a perseverative tendency, such as trying to solve a problem, perseverates too vigorously, its activity spreads to the whole system and wakefulness ensues. In my own case, at least, the perseveration of thoughts and plans disturbs sleep more than do external events and stimuli of an ordinary nature.

Now, the instincts represent, in the main, primitive modes of behavior in the presence of important situations. In the course of time they may become superfluous or may even require suppression in favor of more rational and civilized conduct. This is especially true if the original stimulus ceases to be important in the life of the organism. Sleep, it may be suggested, is such a vestigial instinct. Do we not sleep, as do the chickens also, when night comes on, no matter whether we have been active or inactive, whether we have consumed energy or not? Is not sleep a vague instinct crystallized into a fixed habit, and can it not be eliminated?

In general it is probably true that deeply rooted instincts cannot be eliminated in the individual, but only in the course of generations of natural or artificial selection. By favoring the survival of the offspring of such individuals as show the least inclination to sleep, might we in time build up a race of sleepless men? The prospect is inviting, and I know of no cogent arguments that can be brought against it.

This does not mean that we who are now living can abruptly dispense with sleep with impunity. Instead, to go without the habitual amount of sleep brings distress because our vital nutritive and recuperative processes have since infancy adapted themselves to this rhythmic habit. Any one who has tried knows how difficult it is to break away even from the trivial habit of three established meals a day. The stomach contractions have become accustomed to begin when a certain condition of emptiness and a certain acid accumulation are reached. Gradual modification rather than abrupt change is the effective rule for such a reformation. How much sleep the individual could eliminate without discomfort or danger by saving fifteen minutes a night for the first year, half an hour daily for the second year, and so on, is a problem which might worthily engage the benefactions of some farsighted philanthropist.

This concept of dissociation, it must be said, leaves many questions unanswered. In fact, it is, even at best, not an *explanation* of sleep, but only a further and hypothetical description of it. It consists essentially in showing that sleep involves the nervous activities as well as those of muscles and sense organs. Strictly speaking, it is only an account of some of the more obscure symptoms of sleep. The precise nature of functional dissociation is not revealed, nor is the normal stimulus to it indicated.

More important still, the dissociation of nervous patterns does not explain the characteristic course of images, memories, feelings, pains, and purposes. Images and pains, for example, are not neurones. Even if it be said that they *depend* upon neurones, our ignorance of how and why the neurones are dissociated is scarcely an explanation of dissociated images and pains. Until there is more actual knowledge than now exists about the behavior of the neurones, even the assumptions of psychophysical parallelism rest upon a very sketchy foundation. There is, indeed, something to be said in favor of the doctrine of dissociation as applied directly to the "subjective phenomena"—the images, memories, and feelings, for example, without any reference to their supposed neural correlates.

But the concept of dissociation in some such form as that we have given it may at least be considered a reasonable suggestion by those for whom the explanation of psychic events consists in the exhibition of a correlated set of physical phenomena.

CHAPTER VI

SLEEP HABITS AND COMMUNITY DROWSINESS

> I am satisfied that I have done but little by these observations considered in themselves; and I never should have taken the pains to digest them, much less should I have ever ventured to publish them, if I was not convinced that nothing tends more to the corruption of science than to suffer it to stagnate. These waters must be troubled before they can exert their virtues.
>
> EDMUND BURKE

SLEEP HABITS

With these points in mind, questions of the hygiene of sleep and the proper amount of sleep resolve themselves into merely statistical inquiries. The question becomes, not "How much sleep does man need?" but simply, "How much sleep does he take?" A recent investigation of the number of hours slept, on the average, by nearly 3,000 persons, yielded the following table. The data are quoted from a study by Terman and Hocking.

This table shows a general decrease of sleep hours with increasing age, ranging from nearly eleven hours at seven years to scarcely more than seven hours in the case of the adults. It cannot, however, be said that these sleep habits represent sleep needs. The table may merely show the obvious fact that people who have nothing else to do are likely to spend more time in the stupor. It might even be interpreted to mean that the more intelligent and active people are the less sleep they get along with. But, on the

Average Number of Hours of Sleep, Showing a Decrease with Increasing Age

Age	Number of Cases	Average Hours Sleep Daily
6–8	184	10.8
8–10	509	10.3
10–12	589	9.8
12–14	562	9.3
14–16	445	8.8
16–19	327	8.4
University Students	51	7.4

whole, what people do can scarcely be taken as a measure of what they ought to do.

A striking fact about these figures, not shown by this table, is that at any given age individuals differ more from one another than do these age groups. Thus at the age of fifteen, a typical year in this respect, the amount of sleep taken ranges from five hours at one extreme to eleven and one half hours at the other, a greater difference than that between six-year-olds and adults. With these striking variations in sleep habits in mind, it is easy enough to say what the average amount of sleep *is*, but there is no known basis at present for asserting what it ought to be. In fact, there is some justification for believing that eventually it ought not to be at all. The elimination of the nocturnal stupor is a question of far greater human importance than the reconstruction of industry, the conservation of timber and water power, the eugenics movement, or the League of Nations.

Studies have been made (Terman and Hocking) of the relation between the habitual amount of sleep and the academic success of 1,350 school children, between amount of sleep and the number of "nervous traits," between sleep and the social status of the homes, and between sleep and measurements of intelligence. In all of these cases and for every age there was no relation found. The correlation was neither positive nor negative, but, instead, was close to zero. In fact, for each age "the school grades of the ten pupils receiving the smallest amount of sleep did not rank below the grades of the average sleeper, but, instead, slightly above."

Such data as are available relating to the sleep of the gifted and the feeble-minded throw no new light on the relation between sleep and mental efficiency. "Feeble-minded children, whatever the grade of defect, sleep much *less* than normal children of the same age, the feeble-minded adults much *more* than normal adults." A later study by Terman shows that very bright children also sleep more than children in general. The difference is small in the earlier years, but amounts to about three quarters of an hour by the age of twelve.

The careful investigators reporting these results suggest that the average person takes more sleep than he needs and "that mind and body reach their highest efficiency with a definite, as yet undetermined, minimum of sleep." They suggest, however, that the superfluous hours of sleep may perhaps provide a margin of safety, the benefits of which do not now appear but may be reaped in times of emergency or in later years. There is, however, no evidence that this is anything more than the familiar discovery of a good excuse for a bad habit. It is, for example, very doubtful whether overeating could be justified by invoking the "margin of safety."

EFFECTS OF SLEEP DEPRIVATION

Several studies have been undertaken of the rate of recovery from fatigue after varying amounts of sleep, by measuring the efficiency of performance at these times in mental work. These studies have always been made on a small scale and usually on but one person, the experimenter himself. Until very recently, at least, no investigator in this field has taken the precaution to reach a practice limit in the tests used before beginning his experiments. Hence it is impossible to say whether the results are due to improvement through sleep or to improvement through practice. Data on this point would be of considerable interest and value, but investigations with sufficient scope and based on reliable technique have not yet been made.

In one of the most recent investigations,[1] one subject was kept awake for varying periods (three of 50 hours, two of 90 hours, and two of 114 hours). These periods were distributed through a year and in the intervals normal or control records were taken to show the range of variation under ordinary conditions. In this case precautions were taken to approximate a practice level in the tests before conclusions were drawn, and the experiments seem to have been carefully conducted although on but one subject—a man of twenty-eight years, in good health.

The knee jerk, the pupillary reflex, the sensory threshold for faradic stimuli, reaction time for auditory stimuli and for visual stimuli requiring discrimination, naming opposites, and mental multiplication—all these showed no change that could be attributed to the artificially produced insomnia. Ability to name colors at maximum speed deteriorated, but only when prolonged endurance was required, as in naming 1,200 colors in succession; ability to maintain equilibrium, as in standing without changing the vertical plane of the body, showed marked deterioration during insomnia, but this it is suggested might have been not a direct cause of loss of sleep, but instead due to concomitant muscular fatigue occasioned by the activity required by the subject in order to keep himself awake.

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[1] Lee and Kleitman, "Studies on the Physiology of Sleep," *American Journal of Physiology*, December, 1923.

The most careful attempts to study the effects of loss of sleep by methods of measurement have been reported by Robinson and his coworkers. In one case three subjects were tested for from eleven to twenty-six days, the last four or five days of which followed a period of sixty to sixty-five hours without sleep, two nights of sleep loss. In another case groups of over thirty students each were used. One group, the control, slept as usual. The members of the other group lost one night of sleep. The tests used were strength of grip, rate of tapping, accuracy of aiming, reading printed letters, mental multiplication, and the various types of work included in the Alpha Intelligence Examination of the U. S. Army mental tests. Records were also made of feelings of tiredness and of amount of effort, as reported by the subjects.

So far as the amount and quality of work is concerned, the main conclusion to be drawn from the data is "that the results of the tests were not affected by the insomnia in any marked or consistent manner." The observers conclude that "most of our results are practically negative." But the qualitative results of deprivation of sleep are much more definite. Nervousness, headache, dazed conditions, noticeable speech disturbances, increased irritability, emotional instability, were reported—"a variety of manifestations of disorganization which differ considerably from individual to individual, but which are prominent enough to be important."

The investigators suggest that sleep deprivation "causes a general lowering of feeling tone and that this effect is likely to be accompanied by an increase of effort put forth upon a test task." This would be especially likely to be the case if the tasks were tests of momentary accomplishment, not requiring sustained effort over a long period of time. As in the case of other investigations, a very brief period of sleep sufficed to remove the subjective symptoms—a shorter period, in point of time, than would ordinarily have been taken.

COMMUNITY DROWSINESS

Before leaving the topic of sleep, it may be suggested that social groups as well as individuals show this characteristic phenomenon. Families, societies, universities, political parties, and nations sleep, even as does the individual member. Just as truly, at least, as there is a collective consciousness or a group mind, just so truly is there a community drowsiness and a social stupor. A single example will suffice to show what is here meant.

We have heard much in recent years of "the awakening of woman," but it is likely that when we use the expression we fail to realize the full import of the phrase. We awaken only from sleep. Sleep is characterized by an adaptation to all stimuli, and by the reduction of activity to the automatic and vegetative functions. It is favored by monotony of stimuli and by the suppression of voluntary movements. Awakening is characterized by a brief period of drowsiness, marked by hypnagogic hallucinations of vastness and grandeur, by turbulent and unconstrained imagery and illogical thought sequences, random, spontaneous movements and uncoördinated activity (such as yawning and stretching). Awakening is favored by the variety and novelty of stimuli and by the reflex movements produced in reaction to them.

If, then, woman has been asleep and is now awakening, we should expect to find this clinical picture present in her social history. Following up the clinical picture point by point, we do find the details most strikingly reproduced. The reproduction is so clear that the social psychologist may be convinced that it is no mere analogy. The social life of woman has been characterized by the absence of serious competitive stimuli, limitation to the trivial events of domestic life, the monotonous recurrence of housework, relieved only by the occasional pert behavior of her children and the artificial zest of bridge whist. There has been a clear reduction of activity to the automatic and vegetative performance of biological function and household industry. Her slumber was thus produced, or at least favored, by monotony of stimuli and the resulting adaptation. As the result of excessive biological function, confinement, childbirth, nursing, she has lacked even geographical variety. Chivalry, that poetic form of insistence on biological specilization, led to her seclusion from the dangers of the dark, the clashes and infinite variations of competition and the suppression of initiative. Even woman's dress has impeded her voluntary activity.

The decline of chivalry, the concentration and inventions of industry, and the voluntary limitation of offspring, invited geographical, economic, artistic, scientific, and political variety of stimuli; the correlated initiative and voluntary activity made possible the relation of fellowship between men and women, and introduced the drowsy and hypnagogic state so characteristic of all awakening. Hence we have seen healthy and commendable hallucinations of vastness, grandeur, and achievement, illogical sequences which overlook the fact that after all laws are discovered and all limitations made impossible, each of us is still biologically conditioned and that we must in part divide the labor of the world. We have seen random, uncoördinated, spontaneous activities indulged in chiefly for the pleasure which comes from their exercise, spasmodic efforts to vote, to be sheriffs, to organize strikes, to drive taxicabs, bombard magistrates, and wreck houses of parliament. Meanwhile many definite and serious prizes have gone unclaimed.

But the hypnagogic state is notoriously brief, and when the awakening of the generic woman is complete who knows what new life and freedom, what fresh adjustments of values and duties, opportunities and activities, what dignities and accomplishments are in store for us? The resolution of the problem is not the task of the psychologist. In the diagnosis of the clinical picture he may be interested, but the prognosis is left in the hands of the awakened woman. Our present interest is not in the issue itself, but in the aptness with which it illustrates the general resemblance between the mind of the group and the mind of the individual, and in the speculative danger which such resemblance may provoke. The resemblance is indeed so close that some have been disposed to play loosely with such vague concepts as "the collective mind."

Others reject the "group mind" as being only a convenient way of expressing the similarities of individuals. This latter alternative is undoubtedly the correct one.

We may, moreover, use this illustration as a warning against the use of analogy in studies of sleep and dreams. Analogy may carry one far—so far, indeed, that the actual data of observation are lost sight of. Thus we are easily led to an interesting fiction rather than to a scientific explanation. No literature with scientific pretensions is so infested with analogies as are the books on sleeping and dreaming. Some of these analogies we will encounter at later points, and we may then remember that in our "community drowsiness" we also found an interesting analogy, but were compelled to dismiss it as fanciful.

CHAPTER VII

DREAMS, THEIR MECHANISM AND MEANING

> And it is upon this principle, that the most ignorant and barbarous nations have frequently excelled in similitudes, comparisons, metaphors, and allegories, who have been weak and backward in distinguishing and sorting their ideas.
>
> EDMUND BURKE

Although sleep has not aroused popular interest, and drowsiness has been too little studied, the curiosity concerning dreams has amply compensated for this indifference. Dreams, in the life of primitive men, seem to have been invested with profound significance and to have played a conspicuous part in determining their theories of life, death, religion, medicine, and their crude science of mind and conduct. Naïve accounts of the mechanism of dreams were accepted—thus the soul was said to leave the body during sleep and wander about in strange places. Dreams were supposed to represent the fragmentary memory of the adventures of the wandering soul. The main interest, however, was not in the mechanism but rather in the meaning of dreams. The naïve mind is always looking for signs, and especially for signs that point forward, into the future. Only the sophisticated man realizes that all signs point backward. So far as signs reveal anything at all, they indicate what has already happened. Only in so far as the future grows out of the past and is determined by the past, can the signs of the present be said to point forward and to be prophetic. We need not dwell on the naïve accounts given by the soothsayers and prophets, the oracles and the dream books. There is no known justification for seeking in dreams any occult revelation of hidden mysteries nor of the destinies of men. We must look for the meanings of dreams in their origins and sources. We believe these to be best revealed in the phenomena of drowsiness.

The simplest forms of dreams are to be found in the "flashlight" hallucinations and associative wanderings and substitutions of the drowsy state. Their mechanism is the same as that of our ordinary daytime illusions. In waking life, for example, I hear a shuffling, brushing noise, and it occurs to me that some one is stealthily roving about the house. In my active fancy I see him shuffling toward the window, in muffled shoes, making for the fire-escape, with my watch and wallet in his hands. Upon investigation I discover that the fearful sound was only the swishing of a wind-tossed rosebush against the side of the house.

THE MECHANISM OF REDINTEGRATION

What is the mechanism of this ordinary illusion? It is a simple process, which we are, however, inclined to call by a formidable name—redintegration. A part of a complex stimulus, recurring by itself or in some foreign context, provokes a complete reaction previously made to the total situation of which this detail was a part. Such a process is common in primitive thinking, in infantile learning, in conditions of exhaustion and fatigue, in many of our reactions to poetry and music, and in such psychoneuroses or nervous disorders as shell shock and hysteria. It is particularly conspicuous in drowsiness and in that semistuporous condition in which we dream. An illustration from each of these fields will serve to make the nature of the mechanism or process clear.

The savage fears the name of his enemy in the same way that he dreads an actual physical encounter with him. The name, a trivial detail of the complex experience comprising the enemy, touches off the same emotional response that was originally made to the whole complex—the features, the movements, the name, the weapons, and the attack of the enemy. The sight of whiskers on a strange man leads the infant to shout "papa" and to run toward the stranger. The single element provokes the total reaction pattern previously associated with the parent. Most of the devices of patriotism, the ceremonials of religious devotion, and many types of æsthetic response, on a primitive level, depend for their effectiveness on this redintegrative process. The thrill of piety comes to be aroused by trivial details of the original setting—the cross, the hymn, the candlestick. Patriotic fervor, originating in a complex situation of national danger, is thereafter stirred by the drum, the flag, or the bugle call. A sudden shout, or perhaps the sight of a surgeon's knife, throws the shell-shocked soldier into that complex set of reactions, trembling, fainting, stammering, screaming, which he previously made to a complex experience on the battlefield. Or the sight of a church steeple throws the hysterical patient into an attack of morbid anxiety and fear, quite reproducing the previous reaction to the scene of her mother's death, a trivial detail of which experience was the tolling of a bell in a neighboring church tower. All of these reactions, it will be noted, come in moments of ignorance, absent-mindedness, enfeeblement, or partial disintegration of the personality.

The detail that touches off such a response pattern may be trivial and of almost any sort—a sound, a flash of light, an odor, a bodily contact, a particular word, a certain rhythm or shape, a numerical coincidence, an abstract relation. The pattern that is touched off and perceived may be one that has been recently active and is still perseverating. It may be a pattern of thought or action which during the day has been left uncompleted, or which has been abandoned or suppressed from motives of expedience or of shame. Or it may be an old reaction pattern that has not been exercised for some time but which is now revived by the special fitness of the stimulating detail. In general this is the process which, in describing drowsiness, we called substitution. The fundamental fact underlying all these associative processes is perhaps the tendency for brain patterns to be reinstated more or less completely when any of their parts are excited.

REDINTEGRATION IN DROWSINESS

Consider again our interpretation of the hallucination of the huge bug, alighting on the stage during a concert. Here it seems clear that the three loud blasts brought into activity a faintly perseverating brain pattern, on the basis of a trivial relationship. There were three blasts, there are three levels in the nervous system, and an insect has three pairs of legs. The threeness of the stimulus provoked a perseverating pattern with threeness in it, just as the rustling of the rosebush reinstated another pattern associated with rustling or shuffling noise.

One of the writer's observers had a bad toothache during a given day, and though very sleepy and worn out could not sink into sound slumber. For several hours she lay in a state of semiconsciousness, tossing from side to side in a drowsy effort to find a comfortable position. All day she had been intently working on a coat she was making, and her tossings back and forth were all in terms of the seams on this coat. As she turned to the right, the seam down the right side of the garment was worked upon in her dream, then as that position gradually grew unbearable, the seam began to wrinkle and to become unmanageable. Thereupon in her dream state, she decided to work on the other seam; that is, she turned over in bed to the left side, seeming meanwhile to be engaged in basting and pressing the left side of the coat. This process continued for an indefinite time. The despair over not being able to sleep was, in the dream, a fear that the garment would be ruined. All through these hours she was conscious of the occasional flapping of the window shade, and twice she replied sensibly to questions, and noted the striking of the hour on a clock in a neighboring apartment. But the illusion or dream that she was wrestling with the seams of a refractory garment was not dispelled until she fell asleep at daybreak. Here it seems clear that the substitution of one experience for another, because of their several points of agreement, was the basis of the dream. The kinæsthetic and static stimuli involved in tossing from side to side kept active a cortical pattern that was already in a state of preparedness, and the dream experience consisted of the arousal and perpetuation of this redintegrative pattern.

DREAM ELABORATIONS

The dream, to be sure, often contains greater variety and a wider field of action than in this rather monotonous instance, but even when this is the case it is often very easy to make out in detail the way in which the various substitutions and shifts of context occur. Here is the description of a dream in which playing cards were the principal actors.[1]

> Sometimes I am identified with a certain card or suit. I am not exactly the card but am next door to it. . . . Either the cards are there and mean something else, or else they are not there and I am thinking of people in terms of cards, with the same values and precedence. Or the cards may mean two things at the same time. Then I dream in metaphor, so to speak. And I am half conscious all the while of the confusion of ideas—issues which correspond with the fall of the cards.
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> . . . When I have held good cards or when they have fallen well for me, I do not as a rule dream much. But when I have held yarboroughs and been doubled and roughed all the evening, and foiled in every finesse, I live through new defeats in my sleep. And every turn of the game registers similarly graduated misfortune in some corresponding venture. . . . Here is an instance. I was waked up suddenly one morning and wrote down what I could remember of a bizarre encounter which I had witnessed. The thing seemed to have been going on all night. This time I was detached at first and watched the fortunes of two long sequences in Clubs and Diamonds of five or six cards to the ten and knave in each. Sometimes they were merely unpromising cards, about which I had a vague idea that they would assert themselves by some latent virtue or unforseen chance. Then

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[1] Quoted from an anonymous account in *Blackwood's Magazine*, December, 1910.

I thought of them as people belonging to a middle-class family without much backing but destined somehow to emerge. . . . Sometimes they were cards, sometimes people. I must have been on the borderland of waking, and as the supraliminal consciousness took over charge they were cards, but as I sank back into the subliminal they were people. In one phase of the dream I saw them in an office . . . and they were directing the affairs of the nation. . . . I remember seeing one card or personified card value which stood between Ten and Office jump on a train and stand on the footboard as it was leaving a station, and I saw him swept off by the girders of an iron bridge. . . . In these dreams a card retains its personality from the time it starts individual life until the spectator is lifted up on a supraliminal wave to the literal facts of the game. . . .

One investigator had a series of experiments performed upon himself in order to determine the degree to which external impressions were woven into his dreams and served as their starting point. As he fell asleep in a convenient chair, in the evening, an assistant without prewarning stimulated him in some particular way, then awoke him shortly and listened to the dream, if one had occurred. Such results as the following were secured.

The lips and nose were tickled with a feather: he dreamed of undergoing some severe torture in which the skin was torn from his face. Two pieces of iron were struck together a short distance from his ear: in his dreams he heard bells, which changed to the sound of the tocsin, and he was engrossed in scenes of battle and revolution. He was made to breathe perfume: in his dream he entered a perfumer's shop in Cairo. Pinched lightly on the neck he dreamed that a blister was being placed and in the dream there appeared the figure of a physician who cared for him in childhood illness.

This investigator reports further: "When I suffer from retinal congestion, colored patches and luminous circles shape themselves upon my eyelid. In the short instants during which imaginary images foretell the coming of sleep, I have often found that the luminous image which was due to the excitation of the optic nerve was in some way altered under the eyes of my imagination, and became transformed into a countenance whose bright features represented those of a more or less imaginary person."

It is worth noting in this connection that some modern psychologists insist that all so-called "visual imagery" consists in the "interpretation" of such actual but fragmentary and entoptic visual experiences, rather than in the "reproduction" or faint duplication of past events. Thus Lashley[2] writes:

> The majority of psychologists claim to find peripheral sensory elements in their images. In my own, I find the condition to be as follows. The visual image is made up largely of the feel of movement, with a core of true visual quality. This, on closer examination, turns out to be an actual entoptic stimulus—retinal light or after-image—which is interpreted in terms of the motor activity. Thus an entoptic light, aroused by a pressure, was successively interpreted as a human face, a wolf's head, and the wing of a flying bird, in accord with changes of the motor set.

If this account be accepted, it will much simplify the descriptions of perception and thinking, as well as of dreaming. For the classical riddle of the status of the "image" drops out, and we are left with a simpler description, which might be put in the following words. A fragmentary detail, but an actual sensory event, is named, reported, or otherwise classified and evaluated, in terms of a larger pattern which it evokes or which is evoked with it. This evoked pattern is a typical adjustment to some larger event, of which the stimulating detail might be considered a fragment. The detail is therefore called an "image of" the larger event; it is *named* by indicating the antecedent total of which it was once a part.

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[2] "The Behavioristic Interpretation of Consciousness I," *Psychological Review,* July, 1923.

It is clear that such an account of the nature of the mental image, which seems to be coming more and more into favor, serves once more to emphasize the identical mechanisms involved in drowsiness, in dreaming, in ordinary perception, and in more elaborate thought. The development of this identity will concern us more closely in subsequent chapters.

Consider, for example, a dream reported by Bergson:[3]

> I dream that I am on a platform, addressing an assembly. A confused murmur arises at the back of the auditorium. It increases. It becomes a muttering, a roar, a frightful tumult. At length there resounds from all parts, bursting out in regular rhythm, the cry,—Out! Out! At this moment I become suddenly awake. A dog is barking in a neighboring garden, and with each Wow! Wow! of the dog the cry Out! Out! seems to be identical.

Bergson's explanation of dreaming is that "in the waking state the knowledge we seize of an object implies an analogous operation to that which is accomplished in dream. We perceive only of the thing a mere sketch; this flashes an appeal to the memory of the complete thing; and the complete memory, of which our mind is unconscious, or in any case is only conscious of as a thought, profits by the occasion to spring out."

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[3] *Mind-Energy,* p. 123.

It is clear that our own terminology fits the case neatly enough. In waking life the barking sound would have provoked a more complete setting or perceptual reaction, namely, our thought of the dog, and the result would have been only the judgment, "That is a dog barking." But in the less organized drowsy state this sound redintegrates not the usual or more normal setting, but instead a perseverating or insistent pattern in the mind of a timid lecturer, a growling audience instead of a barking dog. Thus one subject, aroused in a drowsy state by the crowing of a neighbor's rooster, concluded verbally, "That is the Evans crow." But with this came a visual image of the feet and later of the rest of a large fowl, and she added, "That is not a crow." Then came the further corrective interpretation, "Crows do not crow," and finally the correct verdict or perception, "That is the Evans rooster."

THE INFLUENCE OF PERSEVERATIVE TENDENCIES

In some such way as this the perseverative tendencies themselves are the source of dreams. Having started an interesting story, heard an exciting adventure related, listened to a haunting melody, or been compelled to forego some interesting and much desired experience—retiring, in other words, with unsatisfied tendencies or wishes and uncompleted reaction patterns—these tend to persist in activity, or at least in readiness, far into the drowsy state. On the one hand, as we have shown, incoming impressions are received into a context composed of such perseverative patterns. On the other hand, the perseverative activities may themselves be conceived as stimuli. Various partial elements of these patterns serve to touch off other patterns in a redintegrative fashion.

Dream stimuli, then, need not come entirely from outside. They do not consist merely of the sounds, odors, movements, contacts, changes in circulation and in internal organs, and the like, which affect the sleeper. These are often sufficient to serve as a starting point for a dream illusion. But of equal importance, no doubt, are the activities of the brain itself and the perseverative patterns established or aroused therein. These may be crudely conceived as weaving themselves about the incoming impressions and appropriating them, on the one hand, and on the other hand, as being in themselves adequate stimuli to other reactions and ideas and their attendant emotions.

Recently I was looking forward to receiving a check from my publishers. Although I did not know the amount due, and would not until receipt of the check, I had made plans for spending the money, and wished very much that it might arrive promptly. The appointed day came, but with it no check from the publishers. Several days went by, and more and more my thoughts and conversation dwelt on this matter.

Three days had gone, and with them no check had arrived. But that night I had a very vivid visual dream. I saw another man holding up a letter, enclosed in an envelope of the characteristic shape used by the publisher. In the corner of the envelope was the publisher's return address, and as the man in the dream opened the letter I saw him remove a check which was exposed to my view. Most of the check was seen vaguely, but in the lower left-hand corner were clearly to be discerned the numbers $410.20.

Who was the man represented in the dream? He was the co-author of one of the books, and we share the royalties equally. It is clear enough what this dream indicated. Some stimulus had been interpreted as the arrival of my partner's check. And, in keeping with the general exaggeration of drowsy states, the amount represented a more comfortable sum than there was any legitimate reason to expect.

But what caused the dream? One explanation is as follows. I sleep in such a position that when I open or partly open my eyes I look toward a fairly bright window, which has much the same shape as an envelope. In a wakeful moment I suppose that I received a faint visual impression of the window, as the light fell on my opened eyes or perhaps simply on my eyelids. This stimulus was received into a background in which the most active element was the perseverating idea of the royalty check and the details associated with it. It thus becomes interpreted in the light of a perseverative tendency, this tendency being in a very good sense an unfulfilled or uncompleted process, as is true of all perseverations. The man in the dream readily came also, since I had on several occasions during the past few days asked him whether he had received his check yet. Where the specific amount indicated on the check came from into the dream, is not obvious. But there is no reason to doubt that it had a similar origin, either in a perseverating content of the preceding day, or in a related experience called up by such a content, or by some actual visual shape present in the field of view. It is only because this is such a simple dream that it is so easily explained. But there is no reason to believe that more complex dreams are produced by any different type of process or by any more mysterious mechanism.

One observer, on a cold night, was disinclined to exercise an urinary impulse that was realized soon after retiring, and grew in its insistence. Sleep came slowly and the period of restless drowsiness was conspicuous. It was filled by a series of vaguely apprehended attitudes and feelings, which the observer describes in the following words: "First it seemed as if I was about to say something, I knew not what; then as if I had forgotten to do something that should have been done; then as if there were something to complain about; then as if some foreign object were attached to me; then as if I had something that should be thrown away. Finally I realized clearly that the source of these feelings was the state of the bladder. This relieved, sleep came quickly and was undisturbed."

This is a particularly clear illustration. The stimulus, a present organic condition, would in full waking life have been promptly recognized and adjusted. In the drowsy condition its perception was only approximated by a series of attitudes and feelings aroused by it. Each of these attitudes is a familiar and ready one, and all are sufficiently similar to be mistakenly redintegrated by the same stimulus or by one another. They are like the famous "categories of the understanding," waiting to be evoked by stimuli from the environment. As we shall see in the next chapter, their increasing approximation to an "adequate" perception illustrates one of the significant accounts of dream organization.

In this connection it is of interest that the acts dreamed need not issue in the form of overt conduct. The sleeper may dream of walking or of speaking, and yet neither walk nor talk. The patterns concerned in thinking *about* these acts are intact and organized. But they are dissociated, in the usual case, from the other levels and from the arcs involved in the actual execution of movements. Only exceptionally is this not the case, and then we have the somnambulism.

The concept of redintegration is especially suggestive if we suppose that the consciousness of a given moment is determined not merely by particular areas and arcs, but by the total activity or pattern of the brain as a whole. Perseveration of a pattern thus means tendency of the whole brain to act in one pattern rather than another. *Any* stimulus will thus *tend* to set up this reaction pattern rather than others. Especially if the stimulus coincides with some detail of the total pattern will the redintegration of the whole be likely. Or, one perseverating pattern may tend to reinstate another pattern having some elements in common with it. One perseverating pattern may redintegrate another.

CHAPTER VIII

RECENT THEORIES OF DREAMS

> Those who are accustomed to studies of this nature will expect, and they will allow too for many faults. They know that many of the objects of our inquiry are in themselves obscure and intricate; and that many others have been rendered so by affected refinement of false learning; they know that there are many impediments in the subject, in the prejudices of others, and even in our own, that render it a matter of no small difficulty to show in a clear light the genuine face of nature.
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> EDMUND BURKE

Much popularity has accrued in recent years to an account of the nature of dreams presented about a quarter century ago by Sigmund Freud, and more recently espoused by a zealous but uncritical group of disciples. According to this account the dream represents the disguised fulfillment of an unsatisfied longing, a suppressed wish. The wish itself may be one which the dreamer has forgotten, so long ago was it suppressed. Or it may represent an inclination which he has never clearly formulated in speech. In the dream the events of the preceding day, the more recent perseverative tendencies, are so interpreted and manipulated that in fancy the unfulfilled and unconscious wish is realized.

The latent content, that is, the perseverating but forgotten wish, is supposed to be transformed and represented in the so-called manifest content, through various processes of condensation, displacement, dramatization, and elaboration. The manifest content is the dream as it is remembered and narrated by the sleeper upon awakening. The latent content is thus conceived to be the ultimate meaning of the dream, from which the dream is supposed to originate as a device for the protection or promotion of sleep.

TYPICAL FREUDIAN INTERPRETATIONS

A typical instance of a dream analysis on this basis is the following, quoted from Ferenczi's account.[1]

> I was once called upon to analyze the very short dream of a woman; she had wrung the neck of a little white barking dog. She was very much amazed that she "who could not hurt a fly," could dream such a cruel dream; she did not remember having had one like it before. She admitted that she was very fond of cooking and that many times she had with her own hands killed chickens and doves. Then it occurred to her that she had wrung the neck of the little dog in the dream in exactly the same way that she was accustomed to do with the doves, in order to cause them less pain. The thoughts and associations that followed had to do with pictures and stories of executions, and especially with the thought that the executioner, when he has fastened the cord about the neck of the criminal, arranges it so as to give the neck a twist, to hasten death.
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> Asked against whom she felt strong enmity at the present time, she named her sister-in-law, and related at length her bad qualities and the malicious deeds with which she had disturbed the family harmony, before so beautiful, after insinuating herself "like a tame dove" into the favor of her late husband. Not long before there had taken place, between her and the patient, a very violent scene, which had ended

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[1] *American Journal of Psychology,* 1910, pp. 309 *ff.*

by the patient showing the other woman the door, with the words—"Get out. I will not endure a biting dog in my house."

Now it was clear whom the little white dog represented, and whose neck she wrung in her dream.

Even more typical of the Freudian account of the meaning of dreams is the following illustration, quoted from Jones:[2]

A woman of thirty-seven dreamt that she was sitting in a grand stand as though to watch some spectacle. A military band approached, playing a gay martial air. It was at the head of a funeral, which seemed to be that of a Mr. X; the casket rested on a draped gun carriage. She had a lively feeling of astonishment at the absurdity of making such an ado about the death of so insignificant a person. Behind followed the dead man's brother and one of his sisters, and behind them his two other sisters; they were incongruously dressed in a bright grey check. The brother advanced "like a savage," dancing and waving his arms; on his back was a yucca tree with a number of young blossoms.

"The true meaning" it is said became clear after the patient had revealed all the thoughts brought into her mind by dwelling on the details of the dream. "The figure of Mr. X veiled that of her husband. Both men had promised much when they were young, but the hopes their friends had built on them had not been fulfilled. The one had ruined his health and career by his addiction to morphia, the other by his addiction to alcohol. Under the greatest stress of emotion the patient related that her husband's alcoholic habits had completely alienated her wifely feeling for him, and that in his drunken moments he even inspired her with an intense physical loathing.

In the dream her repressed wish that he would die was realised by picturing the funeral of a third person whose career resembled that of her husband and who like her husband had one brother and three sisters. Further than this, her almost savage contempt for her husband . . . came to expression in the dream by her reflecting how absurd it was that any one should make an ado over such a nonentity, and by the gaiety that was shown at the funeral. It is noteworthy that no wife appeared in the dream, though Mr. X is married. . . . In real life Mr. X . . . is an indifferent acquaintance, but his brother had been engaged to be married to the patient and they were deeply attached to each other. Her parents however manœuvred to bring about a misunderstanding between the two and at their instigation, in a fit of pique, she married her present husband, to her enduring regret. Mr. X's brother was furiously jealous at this and the pæan of joy he raised in the dream does not appear so incongruous when we relate it to the idea of the death of the patient's husband as it does in reference to his own brother's death. His exuberant movements and dancing like a savage reminded the patient of native ceremonies she had seen, particularly marriage ceremonies. The yucca tree . . . proved to be a phallic symbol and the young blossoms represented offspring.

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[2] *American Journal of Psychology,* 1910, p. 283 *ff.*

In the dream therefore her husband dies unregretted by any one, she marries her lover and has many children.

As the theory of Freud has developed, more and more lurid details have been added to it. The wish that sets going the dream is asserted to be in most cases a repressed sexual impulse. It is maintained that a table of arbitrary symbols (such as the yucca tree in the foregoing case) makes it possible to interpret the dream, even without the dreamer's assistance, and these symbols relate almost entirely to sexual acts and organs and to domestic persons and relations. If the dreamer tells freely what thoughts the dream brings to mind, it is said that he will reveal its unconscious source and hidden meaning. Such analysis is also said to reveal the causes and to effect the cure of a variety of nervous ailments. The book of dream symbols, it is contended, may also be applied to the understanding of myths, fairy tales, fables, architectural forms, the drama, and the ceremonials and magic of primitive tribes.

CRITICISMS OF FREUDIAN INTERPRETATIONS

We need not undertake a critical examination of all these fantastic dogmas. It is enough to point out that they are not based on evidence nor on observed facts, nor put to the tests of scientific standards, nor subjected to the law of parsimony. Instead they are based on preconceived assurance and faith and the possibility of finding examples which would illustrate the principles if they were true. They can by no means be recognized as a body of scientific principles but constitute rather what one acute observer has called "products of the decorative art."

It should be pointed out, in the first place, that many of the processes involved in the characteristic Freudian interpretations are in no sense peculiar to dream phenomena. This fact does not, of course, invalidate their application to dreams. On the contrary it tends to support the practice of thus applying them. But the knowledge that these principles are common features of mental life in general helps dispel the notion, easily fostered, that dreams have a peculiar and unique characteristic, and call for very special interpretative technique.

Thus the distinction between manifest content and latent content is a fundamental characteristic of all thinking, as we shall have much occasion to point out in later chapters. In all thinking that does not consist in the actual handling of the objects of thought (as in sorting cards, playing checkers) there is to be distinguished the "significant" and the "signified," the symbol and that for which it stands, the idea and its meaning. Thus, in the simple process of reading, there is on the one hand the manifest content—the words printed on the page. On the other hand there is what we may call the latent content—namely, the absent objects or the past events for which the words stand. The latent content is, in one sense of the word, the *meaning* of the manifest content, although we shall later have occasion to criticize this particular use of the word "meaning." In memory, also, there is always some present occurrence or event which stands for or represents some other event which, as we ordinarily say, is "recalled." Strictly speaking it is not recalled at all, nor has it been existing buried in the subconscious. It is still past or absent, but some "substitute stimulus" now functions for it. That is to say, again, even in ordinary memory there is to be made, and we may say always has been made, the distinction between manifest and latent content.

Furthermore, the important principles of dream formation, as they are called—the processes of condensation, elaboration, rationalization, and so forth—are striking features of any act of memory. In fact, the influence of just these principles is what makes necessary such an elaborate technique of examination and cross examination. confrontation and proof, in the case of testimony before the courts. Experimental studies also show that these processes are common characteristics of memory, even for fairly trivial and insignificant materials or events.

Two or three brief indications will suffice to show why the scientific psychologist views the Freudian account of dreams, in those aspects which are peculiar to it, with a critical scepticism. Dreams are asserted to be disguised sex-wish fulfillments because, by taking the details of the dream as starting points and requesting the dreamer, in waking life, to give frank and unrestrained report of everything that these details suggest to his thought, the dreamer reveals the fact of forgotten sexual experiences and repressed erotic wishes. Since by starting with the dream you can arrive at information concerning a particular repressed inclination, it is assumed that the particular wish was the starting point of the dream. This is much like saying that since a baby's cry reminds you of the mewing of a cat, therefore the mewing cat was the cause of the baby's cry.

Start the dreamer from anything under the sun as a stimulus to his waking train of thought—from the ticking of a clock, a patch of moonlight, the dream of some other person, a verse of poetry—and if he frankly tells you everything that comes to his mind during the course of an hour or so, you will discover that he had childhood experiences of a painful or humiliating nature, that he has impulses which he inhibits, and that not all of his tendencies are consistent or harmonious with one another. Indeed, do not give him anything as a starting point. Simply ask him to stare into space and tell you frankly everything of which he thinks. He will be a curious person, or else a liar, who does not report illicit hopes, shameful inclinations, suppressed desires, and unfulfilled wishes. The dream, in other words, is but a convenient stimulus, and the associates it evokes do not necessarily throw any light upon the process of dream production.

But the associates may, as all associates have a way of doing, tell you a good deal about the customary content of the individual's thought, and about his past, and even about his future.

It has also been pointed out that it is truer to say that the dream is a cause of the associated reports than to reverse this order and to assert that since *A* leads to *B, B* must have been the cause of *A*. And several critics have shown how inevitably the Freudian interpreter stops when a sexual fancy is suggested, and not until then. But a train of associates may flow on forever, and what is to determine at what point the significant associate is reached? Surely only a preconceived idea of what the nature of the sought for associate must be. But this is to solve your problem before you begin to investigate it. Such preconceived solutions are familiar to all readers of psychoanalytic literature.

The fact that the dreamer as a waking person has erotic impulses, for example, that conflict with his or her moral sense, that his or her childish ideas have been overlaid with adult considerations, and that these may in time be suggested to the train of thought, set going by some detail of the dream, has no proved bearing at all on the cause or meaning of the dream. It is not yet proved that it causes the dream any more than it causes the ticking of the clock or the patch of moonlight. The argument involves one of the simplest and most obvious logical fallacies, called in the textbooks "affirming the consequent." If some enemy has poisoned my food, I may be expected to show signs of illness. But the fact that I show signs of illness by no means proves that some enemy has poisoned my food. As obvious as this fallacy is, it seems to be one of the most difficult to avoid. The untutored and the thoughtless are especially liable to it. Many insane delusions seem to be based upon it. Inability to avoid it or to recognize it seems to be more characteristic of those trained in the practical arts than of those familiar with scientific method. Medicine, it may be suggested, even in our modern days, is an art rather than a science, and medical training is in practice rather than in inquiry. The psychoanalytic dogmas not only originated, in their specific modern form, among medical men, but have been accepted chiefly by practicing physicians and their neurotic patients.

The assertion that the dream represents the symbolic realization of sexual license may very well be true of the sexual neurotic, and it may often be true of the ordinary individual. The sex mechanism, especially of the male, is a characteristic source both of bodily sensations and of perseverative tendencies. It is also a mechanism that easily gives redintegrative reactions—giving a complex response to some minor detail of a previous situation. But the attempt to show that all dreams, and especially the dreams of women, have this basis, inevitably involves those fantastic literary gymnastics and the verbal jugglery so characteristic of psychoanalysis. Psychoanalogy rather than psychoanalysis should be the name given to this form of entertainment.

OTHER PSYCHOANALYTIC FALLACIES

The fact is that the Freudian psychology in general does not pretend to be based on evidence, in the scientific sense. Scientific evidence consists of facts and data that may be independently interpreted and put to the test of controlled observation. There is another type of evidence, as it is called, a variety frequently encountered in court procedure, which takes the form of the vigorous and positive assertion of some individual that such and such conclusions are correct. Expert testimony is especially likely to take this form, because judge and jury are not competent to understand or interpret the original observations. A psychologist was once called upon in court to prove the truth of certain statements as to the validity of certain methods. For many hours he presented data and facts which to his mind proved the statements to be valid. But this array of actual evidence was rejected as not constituting proof. Finally he took his cue from a more practiced witness who took the stand during his rest period. When next examined the psychologist stated "to my own knowledge and from my own observation the methods are reliable." This was at once accepted as adequate proof and the case proceeded without further delay. It is this type of oracular evidence, the dogmatic assertion of a respectable person, upon which the elaborate system of psychoanalysis is based.

When proof is attempted by some zealous disciple, it takes the form of showing that, if the physician acts as if it were true, he is able to benefit his patients. It will be shown, at a later point that if an experimenter acts as if he were administrating caffein to his subjects, he can secure definite and measurable stimulation in their work, and can even modify their sleep on the following night. But no one familiar with the facts would admit that this practical result proved that caffein was really administered. It is again the old fallacy of affirming the consequent. If I act on the assumption that there is a bear under the bed, and especially if I point out vague outlines somewhat remotely resembling a bear, and relate stories of people who were devoured by bears, I may very well succeed in keeping the children from climbing out upon the floor. I may even induce them to lie quiet and to go to sleep. But this does not prove the truth of my assertion. I could have secured the same results by assuming that there was an Indian behind the door. Neither does the success of a medical technique of itself prove that the hypotheses underlying that technique are correct, particularly when the technique is one developed for the treatment of those conditions known as psychoneuroses.

The reason for the popular vogue of the Freudian theories is of course to be found neither in the nature of the evidence nor in the success of the technique, but in the sexual content of the theory. The theories give a certain warrant for discussion of and conversation about a set of topics and interests that custom and religion have heretofore tabooed and deprecated. So far as it is possible to see, the general result is likely to be wholesome rather than otherwise. There seems to be little doubt that these social and religious taboos are in part the survival of ignorant and primitive superstition, and in part a system of devices for the control of children and stupid adults. We can well afford to lose the superstitions, and it may be that honesty and frankness are better methods of social control than are mystery and secrecy.

WISH FULFILLMENT

Certain features of the Freudian account of the dream do however accord with the observed facts and the simpler explanations of sober psychology. These features are suggested in a general way by the term "wish fulfillment." In a sense, every illusion is a wish fulfillment. The misinterpreted noise, for example, touchs off a pattern of thought or action that was preëstablished and lying in readiness. It seems not entirely absurd to call this simple perceptual pattern a *wish*. On a more complex level the perseverative tendencies, the uncompleted processes, the unpaid debts, the neglected promises, deferred hopes, the unrealized purposes and the unsolved problems and unsatisfactory adjustments are wishes of a more elaborate kind. But we conceive them as resting on the same type of organized nervous pattern. To be sure, there is nothing essentially Freudian about this conception, even in the case of dreams. Before Freud's work appeared it had been pointed out (Delage, 1891) that "an object would not be dreamed about if it had been dealt with to satiety on the preceding day, and that only those tendencies operate in the dream that are not satisfied in daily life." Indeed, several years before the work of Delage, Robert (1886) had pointed out that one rarely dreams of the significant and fully settled activities of the day, but rather of the fleeting, unattended, and not completely settled or concluded experiences. The last step in parliamentary procedure is to dispose of "unfinished business." This process also occupies the last few moments of a stretch of waking life.

Twenty-five years ago (March 20, 1901), Bergson, in a lecture before the Institut Psychologique pointed out that "in normal sleep it is the thoughts which have passed like flashes through the mind, or the objects which we have perceived without paying attention to them, which dreams are most likely to bring back. If at night we dream of the events of the day, it is insignificant incidents, not important facts, which will have the best chance of reappearing." He also suggests the previous observation of this tendency by Delage, Robert, and Freud. Bergson's illustrations are as follows:[3]

> I am in the street, I am waiting for a tram car to pass, it cannot touch me because I am on the pavement. If, at the moment of its sweeping past, the idea of a possible danger occurs to my mind, nay, even if my body instinctively recoils without my being conscious of feeling any fear, I may dream at night that I am run over.
>
> I am watching by day at the sick-bed of a friend who is dying. Only a ray of hope springs up for an instant—a faint ray, I am barely conscious of it—my dream at night may show my friend recovered. In any case I should dream he was cured rather than dead or ill. What reappears by preference is what had been least noticed.

Such indications also suggest that the doctrine of suppression which is so emphatic a part of the Freudian account is for the most part at least superfluous. It is not the *suppressed* but the *unexpressed* that is likely to be involved in the dream. It is not uncommon for the "wish" involved to be one not yet clearly formulated, articulated, or verbally or otherwise reported and identified. It is this lack which constitutes its incompleteness. And since, at a later point, we shall have occasion to identify consciousness with report, it is easy to see that it is just this lack of formulation or expression that *constitutes* the unconsciousness of the wish, when it is unconscious. It is not that the wish persists, repressed, in a special unconscious realm, but merely that it has not yet attained the stage of symbolic report. Symbolic report, in human beings at least, is usually if not always verbal formulation.

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[3] *Mind-Energy,* p. 131.

In the dreams of sleep, as in the daydreams of waking leisure, it is the established patterns of thought, the insistent tendencies, and specially the uncompleted or unfulfilled and hence perseverative processes that lie in the most active condition of readiness. It is these processes that are most readily excited by stimuli from the outside world, by stimuli originating within the organism, and by other neural patterns that have elements in common with them. In what has thus been called "the perseveration of the unadjusted" is to be found the psychological foundation of what has more picturesquely been called "wish fulfillments."

DREAMS AS TRIAL PERCEPTS

Among the significant and psychologically conceived studies of the dream processes are those in which Horton has formulated his account of them as "trial perceptions." In these accounts the dream is conceived as being instigated by some stimulus. The varied details in the course of the dream represent successive approximations to an adequate or satisfying interpretation of this stimulating event. In waking life, and at the moment of awakening from the dream in many cases, adequate perception consists in the arousal of an appropriate response on either the postural, the autonomic or the cortical levels—that is to say, appropriate understanding, or emotion. or motor adaptation.

But in the drowsy state the ordinarily appropriate and relevant patterns, by virtue of the dissociated state, have an inertia which delays their evocation. Meantime, perseverating and unadjusted patterns are in a higher state of readiness and are more easily touched off by such features of the stimulus as are even only remotely associated with them. This gives erroneous perceptions, which, in typical cases, may be seen, as they succeed one another, to form a series of approximations to the correct apprehension. The perseverating patterns, thus redintegrated, belong to antecedent sets or situations.

The consonance of this account with the redintegrative formulation, as we have given it, will be clear from the following quotation from one of Horton's papers.[4] "I have come to regard the successive evocations of imagery in the dream and even their reciprocal adaptations under the influence of creative fancy, as being trial perceptions or attempted responses to one or more cues, either sensory or psychic." The "bladder sensation" experience cited in the preceding chapter affords a neat illustration, from the drowsy period, of just such a series of approximate adjustments or interpretations. Apperception is not as prompt as usual and the period of delay is occupied by ambiguous and perhaps incompatible responses. This we have already illustrated in the example of the drowsy perception of the crowing rooster.

It is well known how in waking perception the momentary "mental set" coöperates with the stimulus in determining the interpretative response. In the case of the hunter, intent on game, almost any bit of stubble or obscure stump provokes the perception "rabbit"; that is, instigates those attitudes, adjustments, feelings, expressions, and assertions appropriate to the presence of an actual rabbit. Every unwonted noise inclines the motor driver to search for "engine trouble." In the shell-shocked soldier any sudden stimulus sets up the startle or fright reaction. Even the patient subject in a laboratory experiment on psychophysics mistakenly perceives the new weight, light, sound, or what not, as the one he has so often experienced before in the series, thus exhibiting what has been called the "central tendency of judgment," again a redintegrative phenomenon. In one instance "a faint sound was first taken for a bird singing, then for a distant locomotive whistle, and finally for what it was, the tinny noise of a piece of metal carried in the hand and brushing against the overcoat as the person walked; this series occupied not over five seconds."

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[4] *Journal of Abnormal Psychology.* A series of papers in the 1918 to 1921 volumes.

To take this last illustration: if it had been arrested in its first stage it would have been typical of the *drowsiness complication;* allowed to progress into its second stage it becomes like a mild *dream elaboration;* reported in its final stage, it is properly described as a *waking perception.*

ADLER'S ACCOUNT OF THE DREAM

From the very diffuse writings of Adler one may extract an account of the nature and meaning of dreaming which in many ways is in accord with demonstrable psychological tendencies. The dream is conceived to be "a preparation for confronting some problem which has presented itself, in accordance with the desire for superiority, and by means of an analogy." In dreams "all the transitional phases of anticipatory thinking occur as if directed by some previously determined goal and by the utilization of personal experiences." Thus we have in the dream the working over of perseverating problems and unfinished topics. Such sensory and imaginal materials as are available serve as the alphabet or language in which these topics are expressed. The dream thus represents not only a "trial perception" in Horton's sense, but also a "trial solution."

The phenomena of "substitution," which we have seen working in the drowsiness formations, underlie the "analogy" to which Adler refers. Thus he writes:

> The dream rarely gives a presentation of facts . . . in which recent happenings or pictures of the present occur. For the solution of an undecided question simpler, more abstract and infantile comparisons are at hand, comparisons frequently suggesting more expressive and more poetical images. For example, an impending decision may be replaced by an impending school examination, a strong opponent by an older brother, the idea of victory by a flight to the sky, and a danger by an abyss or a fall.

Adler thus takes good account of the phenomenon of substitution or confusion, and of the facts which we discuss at a later point under the head of "symbolism of relations." A special virtue of the very sketchy account which he gives lies in its close relation of the dream to ordinary thinking, a relation which we have been seeking to emphasize. For Adler the dream is an actual piece of thinking, in which some conceived impending emergency, represented by an analogy, is handled to the advantage of the dreamer's prestige. This clearly relates the dream thinking to the familiar experience of "daydreaming," which is so notoriously the rehearsal of a solution or the phantasy of a dénouement. And with this we have a perfect transition to ordinary thinking, which we might succinctly define as manipulating the absent by means of present signs.

The most striking thing about the dream, and the feature that gives Adler's account the suggestiveness it possesses, is that symbolization here takes the imaginal rather than the verbal form. Difficulties, problems, situations, and absent objects and persons are represented through the symbolism of imagery, often visual in mode. Relational features of such imagery function for relational features of past experiences, and this is what constitutes what Adler calls the "analogy." That such imaginal representation is more utilized in childhood, while vocabularies are still inadequate, than in adult life when even the most complex representation is possible in verbal terms, is what has led many to characterize the dream thinking as infantile.

CONFLICT

It is, moreover, this trial-perception aspect of the dream that lends a certain plausibility to a view sometimes advanced, most confidently, for example, by Rivers, according to which the dream represents the solution of some personal conflict. The concept of conflict very readily becomes an animistic one, in which tendencies are endowed with more or less conscious purposiveness and seem to wage a deliberate warfare with one another, with a rich repertoire of tactic and strategy.

What seems actually to underlie the situation commonly designated "conflict" is more intelligibly described as the "incompatibility of antagonistic adjustments." When two incompatible tendencies perseverate, either might be readily redintegrated except for the perseveration of the other. In so far as one perseverative tendency may, however, be more vigorous and insistent than the other, or more potently reinforced by the nature of instigating stimuli, it will be this tendency rather than its "antagonist" that will determine the content of the drowsiness complication. The dominant perseverative tendency, thus redintegrated, will then determine the apperception of the stimulus, thereby demonstrating its superior insistence. Figuratively one may designate this the "solution of a conflict." Factually however, it may be best described as the indication of the relative strength of two incompatible tendencies. The personification of this drama of perseverative tendencies may assist in their superficial understanding by naïve patients, but it cannot be said to promote the actual understanding of mental processes.

Any case of gradual or difficult perception is thus an illustration of "conflict" in its legitimate sense, which requires no personification. Whether the perceptual adjustment be postural, autonomic, or cortical, the process of trial redintegration is the same. Just as in ordinary perception the determining "mental set" represents a "latent content," reinstated by the stimulus, so in drowsiness and the dream the formal perseverating pattern or attitude is redintegrated by the manifest clue. And as Dewey and others have so clearly shown, the more elaborate acts of reasoning exhibit a similar but more cogently controlled trial-perception series.

A brief summary of the account here suggested of sleep and dreams would be as follows. Sleep is the active, instinctive dissociation of the established patterns of the nervous system, which begins with the associative neurones, spreads to the central neurones, and proceeds downward from the upper level toward the lower level, which, however, is never completely involved. These stages afford the basis for the phenomena of drowsiness and the stupor of sleep. The persistence or the reinstatement, within this dissociated system, of a more or less independent pattern, affords the basis for selective wakefulness, on the one hand, and, on the other, for the conscious experiences of the dream. The dream contents or materials are provided by the incoming sensory impressions reaching the sleeper, the perseverative tendencies, and the related patterns aroused by them. This is the process that is vividly but somewhat fancifully called "wish fulfillment." More simply it represents, under the ordinary laws of perception, the tentative and approximate appreciation of some detail of an instigating stimulus. The fundamental principle that is to be discerned operating throughout is that type of mental behavior which we have called "redintegration."

CHAPTER IX

MISCELLANEOUS DETAILS ON SLEEPING AND DREAMING

> An easy observation of the most common, sometimes of the meanest, things in nature, will give the truest lights, where the greatest sagacity and industry, that slights such observation, must leave us in the dark. . . .
>
> EDMUND BURKE

CONCERNING SLEEPLESSNESS

There remains a number of incidental points relating to sleep and dreams which are of sufficient interest to be mentioned, although they have not fitted into the development of our theme up to this point. Some of these are only errors or popular superstitions, while others introduce details that seem to have foundation in fact but are liable to misinterpretation.

It is often asserted that sleep is so sadly impaired by such mild stimulants as coffee, tea, and nicotine, that these stimulants or depressants should not be used. Those who have accepted the suggestion as to the waste involved in sleep will not be so readily convinced of the iniquity of these practices. But the point now to be presented is the evidence that much of this sleep impairment from the use of coffee, tea, and similar substances, comes not from any direct action of these drugs, but instead from the expectation and wish of the sleeper.

This may be illustrated by referring to an actual experiment. On one occasion sixteen people served as experimental subjects, spending their days in the laboratory and sleeping at home, under the usual surroundings. Meanwhile, there was administered caffeine during the afternoon in systematic dosage, and the effect on their mental and motor capacity, their sleep and general health was observed. The investigation was continued for a month and a half. Each morning they reported upon the the quality of their sleep during the preceding night, reporting it as better than usual, usual, or worse than usual. Let us represent these three degrees by the numbers 300, 200, 100. Thus we can combine in the form of an average the reports of all the individuals. The larger the number the better the quality of sleep.

On some days no dose whatever was given. The sleep average of the nights following these days was 221. On other days a plain syrup, consisting of water, sweetened and flavored, was given. No caffein and no other active drug was present, but the subjects supposed that they were now being given caffein-containing beverage. The average sleep after such days fell from 221 to 192, a loss of 30 points.

Now the average cup or glass of tea or coffee contains about two grains of caffein. On certain days there were added to this syrup either 2 or 4 or 6 grains of caffein, approximately, corresponding roughly to 1, 2, or 3 cups of coffee. Following one cup the average sleep was 220, the same as on days with no dose of any kind. After two cups the sleep quality was 191, quite the same as after the pure syrup doses. Only in the case of the six grain doses, equal to three cups of coffee, did the sleep quality fall lower than this. Here it fell to 150, a very decided drop. That is to say, the effect of suggestion and expectation produced the same effect as did the amount of caffein contained in two cups of coffee when added to the syrup. The equivalent of three cups of coffee was required to produce an effect which was greater than that produced by these mental influences.

Such purely mental influences as expectation, intention, and purpose are potent to affect not only our sleep, but our waking efficiency as well. Here, for example, is a table of results showing the way in which the measured efficiency of work was affected in these subjects by the three conditions just described—no doses whatever, doses of sweetened water, and doses of the water containing varying amounts of caffein. The table compares that part of the day's work before the dose or time of dose, with the work done after this time on the same days. If the figure is 100 per cent it means that there is no change. The work is as usual. If the figure is over 100 per cent it means that a longer time was required for the same performance or task, indicating fatigue or some other source of inefficiency. Figures lower than 100 per cent, on the other hand, indicate stimulation, or greater working capacity.

EFFECT OF VARIOUS DOSES ON THE MEASURED EFFICIENCY OF WORK

Kind of Work	No Dose	Syrup Only	Syrup and Caffein
Naming opposites	103	101	100
Naming colors	105	98	96
Calculation	104	102	101
Rate of tapping	103	99	98
Discrimination	101	99	99
Averages	103	100	99

Note that on days with no doses the tendency is always toward fatigue, which ranges from 1 to 5 per cent, averaging 3 per cent. On days with syrup only there is without exception an improvement, which ranges from 2 per cent to 7 per cent as compared with the normal days. The average effect of the suggestion and expectation produced by the glass of sweet, flavored water is just great enough to offset the usual 3 per cent fatigue.

Consider now the effect of the doses actually containing caffein. Here there is, except in one test which shows no change, a further improvement, which is, however, in every case less than that produced by the sweet water. Here of course the third column must be compared with the second as a base, just as the second is compared with the first as a base. The second column gives us in this way a "control" or check on the effect actually due to the caffein, rather than to the mental influences. The average effect of the added caffein is just 1 per cent actual stimulation.

Comparing the three averages, the syrup produces a change from 103 per cent to 100 per cent, a 3 per cent effect. The syrup with caffein added produces an additional change from 100 per cent to 99 per cent, a 1 per cent effect. The actual caffein affect is thus only 1 per cent, since three-fourths of the change from 103 per cent to 99 per cent was produced by the syrup alone. The effects of suggestion and expectation are thus three times as great as the effect of the caffein. In ordinary life the total change would have been attributed to the caffein, since ordinary observation does not adopt such controlled technique as does scientific experiment.

The general conclusion suggested by these results is very important. It is to the effect that both in our waking and in our sleeping the influences of central or mental factors, our thoughts and expectations, our fears and purposes, are at least as potent as are many of the external agencies that reach us. In the case of sleep, for example, it is important to realize that insomnia is more likely to be the result of influences from within our own minds than it is to be caused by the disturbance of external stimuli or of ordinary substances taken into the system. As we have already seen, it is the perseverative brain patterns and tendencies, in the main, that disturb our sleep with dreams and partial wakefulness, just as in waking life it is these factors that produce illusion and error.

CONCERNING DREAMING

Concerning dreams themselves many statements have been made which do not entirely withstand critical scrutiny without modification. Thus it has been asserted that the frequency of dreams varies directly with the activity of mental life and the increase of intellectual development. There is quite probably some truth in this assertion, since the more developed and vigorous the mind the more numerous and persistent will be the brain patterns which underlie the dream composition. But it is also true that increased mental development is likely to mean greater interest in all experiences, including dreams, and also more inclination and ability to observe and to remember them.

Again it is stated that the younger and the more uncultured the sleeper the more closely will his dreams be related to the experiences of the immediately preceding day. This, again, is probably true on the whole, since the younger and less cultured the individual the more limited, temporary, and immediate are the dominant brain patterns and the perseverative tendencies. In waking life the stupid and the young are controlled by local stimuli, present purposes, and shortsighted intentions. Responsibilities and goals that reach backward or forward over a period of months or years play little part in the waking life and in the daydreams of the immature, the uncultured, and the stupid. Still less should we expect these to influence their drowsy thoughts and dreams.

Some observers have reported that with the onset of old age dreams decrease in richness, number, and variety, and that old age comes more swiftly on those who dream little. The first statement is entirely consistent with the general tendency for all forms of imagery to fade with age, and with the tendency of the aged to lose somewhat of their purposiveness, their strenuous perseverative thoughts and their responsibilities. The second proposition, however, is anything but demonstrated, and no evidence is available either on one side or on the other, unless it can be shown that the intelligent live longer than the stupid.

Criminals, it has been said, dream rarely and little, and the greatest criminals least of all. The same thing is said of idiots. The evidence for this, again, is of the legal type, consisting of the testimony of some one or the expression of somebody's opinion, rather than of the scientific type—the presentation of facts and data for independent interpretation. But the statement is consistent with certain other facts which are readily substantiated. By the word "criminal" is, of course meant, those who are known to be such, those, in other words who have been caught. Evidence is abundant to show that criminals who are caught are to a surprising degree the stupid and the feeble-minded. Moreover, they are the individuals who act impulsively and immediately upon the suggestion of an idea, who do not suffer much from uncompleted or suppressed tendencies and hence have fewer perseverative tendencies and unrealized wishes. Still more relevant perhaps is the fact that criminals do not always tell the truth and that idiots often cannot, hence data based on their testimony are not to be accepted at their face value.

Freud has observed that in the case of children, at all events before the fourth year of their age, the dream always expresses in an obvious and undistorted form an unfulfilled and conscious wish of recent experience, and that only with older people, on whom the necessity of suppression falls, does the dream assume a disguise and express or realize a deep-seated, obscure, and often inarticulate, or, as Freud calls it, an unconscious, wish. One who bears in mind the poverty of a child's experience, the transient and shifting character of his purposes, interests, and intentions, and the relative simplicity of his mental patterns, will be disposed to accept this general statement as plausible, especially as related to the years preceding speech.

The setting of a four-year limit must, however, be considered only an approximate statement for an approximate child. Many children at the age of four have the mentality of six. Others, again, have a mentality of only two or three. We should expect the mental age, rather than the calendar age, to be the determining factor. Even with this qualification the effect of age will not enter abruptly but will gradually show itself in the continuous process of growth from infancy to maturity.

This age level, it may be noted, is approximately that before which we have no permanent memories capable of verbal report. This seems to indicate that up to this time there is little interrelation of processes, that the child's mind is, to begin with, a dissociated mind. Development and education consist in large part of the integration of these dissociated elements, and it is this integration which facilitates both memory on the one hand and critical evaluation or "censorship" on the other. The daytime fancies of the child, also uncritically acted upon and believed, further illustrate the original dissociation of patterns one from another.

TYPICAL AND RECURRENT DREAMS

A number of *typical dreams* have been reported, that is, dreams which nearly every one occasionally has, such as the dream of flying or falling, or the dream of being half naked in a public place. Many bizarre interpretations of such dreams have been offered, culminating in the recent Freudian suggestions which would give these dreams a sexual significance and make them symbolic of suppressed tendencies gratified in the dream. That a sensible account of the frequency of these dreams may be found in something like our concept of redintegration is suggested by Bergson's explanation of them, given many years ago:

> Suppose, in our sleep, the contact of the body with the night-dress reaches consciousness: the sleeper will dream that he is lightly clad. Then, if his dream is at the moment

taking him through the street it is in this simple attire that he presents himself to the gaze of passers-by—without, however, their being shocked.

Referring to the dream of flying, floating, or moving through space without touching the ground, Bergson also writes, as follows:

> This dream, when once it has occurred, tends to reproduce itself, and at each new experience of it we seem to be saying: "I have often dreamed that I was moving without touching the ground, but this time I am doing it while awake. I now know and am indeed proving to other people that we may free ourselves from the law of gravitation."
>
> If you wake up suddenly this is what you probably find. You feel that your feet have lost contact with the ground, and this is so, for you are in fact lying extended in your bed; on the other hand, believing you are not asleep, you do not realise that you are in bed. Therefore you must be standing up, and yet you cannot be touching the ground. Such is the idea which your dream is evolving.
>
> Observe also that when you feel you are flying, you believe you are thrusting your body forward on the right side or the left by raising and flapping your arm with a sudden movement, as though you were spreading out a wing. Now this is just the side on which you happen to be lying. Wake up and you will find that the sensation of effort for flight coincides with the real sensation given you by the pressure of your arm and of your body against the bed.

It is, perhaps, necessary to come somewhat closer to the psychological events than Bergson here does, if the typical dream is to be given anything like a general formula. Thus, the dream of nakedness need not wait until, in some general drama, one is "taken at the moment through the street." Nor, perhaps, does a fixed though one-sided posture satisfactorily explain the interpretation of flying. The typicalness of such dreams is obviously due to typical arrays of stimuli and to common attitudes and patterns of interpretation. Ordinary waking experience and our common categories of description and report represent the extreme form of such typical perception. In a later chapter the various degrees and persistences of typical perception will be seen to underlie the conventional distinction between the mental and the physical worlds. The significant fact is that were our "typical" dreams only sufficiently typical and coincident in time, they would no longer be considered dreams, but common perceptions of natural events.

The typical dream is readily placed with the recurrent dream. Handball players easily establish recurrent motor dream tendencies, by playing over much. Slashing and striking arm movements thus set perseverating, constitute both persistent stimuli and easily redintegrated responses. Any profound emotional shock, such as those incurred in battle or in accident, establishes persistent patterns of imagery, attitude, and feeling, which thereafter are readily reinstated by a variety of stimuli resembling details of the original situation. Prolonged anxiety over a problem, a task, or a responsibility entails attitudes that recurrently appear as interpretative forms for a wide range of stimuli. For this reason the recurrent dream may be supposed to betray with special accuracy the types of life situation that have most impressed the dreamer.

In the average educated person these situations are far from being always erotic. To the school principal, the disciplinary situation; to the public speaker, the restless audience and the state of unpreparedness; to the parent, the injured child; to the engine driver, the highway situation; to the automobile owner, the lost or stolen car: these afford interpretative patterns that are both typical and recurrent. To insist on finding in them the struggle of constellation and censor, the Œdipus complex, the ambivalence of emotion, sexual symbolism, and other Freudian inventions, is only evidence of perverted logic, which quite ignores the simple evidence afforded by the observations of drowsiness substitutions.

CHAPTER X

THE DREAM AS A PSYCHOLOGICAL INSTRUMENT

> We ought to compare our subject with things of a similar nature, and even with things of a contrary nature; for discoveries may be and often are, made by the contrast, which would escape us on the single view. The greater number of comparisons we make, the more general and the more certain our knowledge is like to prove, as built upon a more extensive and perfect induction.
>
> EDMUND BURKE

Up to this point in our discussion of sleep and dreams these topics themselves have been the center of our interest, and we have often brought to bear on their interpretation our knowledge of mental life in general. It may perhaps be only justice to the subject and to our own interest if we now reverse the point of view. We may thus inquire what light the drowsy or dreamy consciousness throws on the processes of more alert thinking.

The discussion of the state of drowsiness limited itself to an attempt to describe the drowsiness consciousness without reference to its bearing on other mental processes. It seems, however, that the drowsiness experience is not merely interesting in its own right, but also throws light on the nature of more complicated and deliberate acts of thought.

The distinction between action and thought is traditional. Even when both have to do with problem solving or the carrying out of aims or purposes, action deals directly with the objects of the environment, whereas thought deals with these objects indirectly, through the use of signs or symbols. Certain types of conduct come midway between the purest action and the purest thought. Thus, in dealing directly with a refractory gasoline engine, and adjusting its parts in an experimental way in order to make it run, I am not thinking, in the present sense of the word, but acting, in the main. If in the darkness of night I mentally rehearse my difficulties with the engine and in imagination manipulate its various parts, I am thinking, in the extreme sense of the term. In reading a printed or written account of the method of adjusting a gasoline engine, I am thinking, in a sense, since the engine is not directly before me, but is represented by the verbal symbols and diagrams. But in a sense I am acting at this time, for the symbols, that is, the words and diagrams, are definitely physical objects to which I am reacting.

We have already had occasion to point out numerous similarities between the drowsiness and dream experiences and waking thought processes. Thus we have seen that the influence of persisting attitudes or "mental set" is common to drowsiness, the dream, and ordinary perception. We have seen also that all three of these processes arise from some instigating event or stimulus, of which they are the continuation; that the processes themselves are series of tentative approximations toward adequate adjustments or interpretations; that the redintegrative formula applies equally to all of them, regardless of the level of complexity on which the adjustment occurs, and regardless also of the correctness or adequacy of the interpretation. We have now to consider certain more detailed applications of drowsiness and dream phenomena to the description and understanding of more formal thinking, ordinarily called reasoning.

THE PSYCHOLOGY OF THINKING

The type of thinking in which we are here interested is the extreme form, in which neither the actual objects nor any objective symbol is present to general inspection. In such pure thought it is assumed that *something* must be actually present in consciousness besides the *meanings* or objects thought *about*. The problem of finding out precisely what it is that is in the mind at such a moment, which stands for, represents, or symbolizes these meanings and objects, is extremely interesting. In popular terms we usually say that at such moments the objects themselves are not there, but only the *idea of* them or the *thought* of them. Now what is the nature of such an idea or thought?

In some cases it can be seen that the content that bears the meaning is some movement, incipient gesture, muscular strain, or general bodily set or attitude, definitely associated with the object or situation that is meant. Thus the thought "in the heavens above" may be represented by a slight elevation of the eyebrows, and the thought "in the waters under the earth" by a lowering of the eyes and a drooping of the eyelids. Such motor signs are genuine objects, similar to words and diagrams, and, if only they be sufficiently vigorous, they are open to the inspection of any observer.

In many cases, however, the immediate content of consciousness is said to be a "mental image." We can *think* of objects even when they are not present to our sense organs, by calling up these memory images or these images of imagination. Thus, I can call up in my mind's eye more or less vividly my boyhood home, and seem to see, though more obscurely than if present on the spot, the house, the barn, the grape arbor. I can perhaps smell the honey in the bee boxes and can hear the general hum and stir of the hives. I can do this, it is commonly said, because I can call up mental images of these past experiences. Or, by putting together the images of wheels, sails, birds, ropes, and the like, which I have actually seen in the past, I can create in my mind's eye an airplane of a pattern which has never yet been constructed.

To be sure, there has been, in recent years, a disposition on the part of some observers to discredit this traditional account of the mental image, and to offer revised statements of its supposed nature and function. Sometimes we are merely told bluntly that no such things as mental images exist, that what earlier observers described as such are really only incipient movements, implicit speech, and the like. A somewhat less dogmatic denial takes the form of suggesting that the so-called mental images are always made up, on the one hand, of vague and patchy cores of actual sensation, supported and interpreted by a motor attitude or general bodily set.

By either of these two accounts the "centrally excited sensation" or mental image of the classical psychology is rejected, or else its nature is considerably revised. For our present purpose we need not take sides on this issue, which only more careful observation can decide. Since our main concern is to be not with such images but instead with certain substitutes for them, we may still continue in our discussion to use the term in the classical way, to mean a sensory process aroused not directly by a peripheral stimulus but by some preceding activity of the nervous system itself.

IMAGELESS THINKING

The traditional account of a thought experience, especially that given in the older textbooks, proceeds in terms of these images—such sensory images as we have already described in connection with drowsiness. Thus, Binet, who wrote a book on *The Psychology of Reasoning,* describes reasoning as "a succession of three images, the first evoking the second by similarity, the second suggesting the third by contiguity." Thus, if I reason that "Socrates, being a man, is therefore mortal," this would mean, according to Binet's account, that the image or mental picture of Socrates calls up a similar image which represents humanity. But since I have always found humanity in company with death, the image of death scenes or of a dead man comes to mind. By similarity *Socrates* evokes *man,* which by contiguity suggests *death,* and this succession of three images is a syllogism, an act of reasoning.

But experimenters who have set themselves the task of observing what actually goes on in their minds when they think have frequently reported inability to detect such images as Binet describes. Thus in the thought of a relation, in the consciousness of purpose or the awareness of intention, many observers report that no sensory images of any kind whatever are present. On the basis of these results it has been suggested that there is such a thing as a "naked thought," an imageless consciousness, and that thought does not always move in terms of images.

In fact, even in Binet's early account of thinking as a succession of three images, he was at once compelled to admit that the image corresponding to the middle term of the syllogism was not usually discoverable. It was thus an "invisible image," a hypothetical or fictitious image, not an actual one; it might indeed be better described as an "imageless thought." Thus, in his account of the perception of a book, he writes as follows:

> The actual vision of the book (A) excites in our thought by the force of similarity the ocular image of the same book (B) which is due to a former vision, and this second state of consciousness in its turn excites, by the force of contiguity, the group of tactile and muscular impressions (C) due to a previous handling of the book. It is the state of consciousness (B) which enables the first state to excite the third; so I propose to call it the *intermediate state of consciousness,* in order to express its function.

But on the same page he is compelled to qualify this account of the intermediate image, and he does so in the following words:

> The curious fact is that this image (B), the visual recollection of the book, does not make its appearance, in spite of the importance of the part it plays. When we look at the book we do not have, simultaneously with this vision, the distinct recollection of a former vision. Yet this recollection constitutes an indispensable part of the operation; it is in a manner "invisible and present"; it is fused with the visual sensation of the moment and becomes one with it, so that this sensation is found directly associated with the group of tactile and muscular images.

It is clear enough that even in this historical effort to describe thinking in purely imaginal terms, something nonimaginal had to be introduced; something, with an indispensable function, was present that could not be introspectively observed. This "unconscious image" of the associationists is perhaps the direct forerunner of the "imageless thought" or the "pure thought" of more recent years. In a sense it corresponds also to the "universals" of the scholastic and idealistic logic.

Clearly individuals differ in the type of content most relied on in their thinking, and, with the same individual, a given occasion may involve many types of content, or the type of content may vary considerably with the occasion. In general it has been assumed that one or more of these elements, perceptual object, objective symbol, motor adjustment, or imagery in one or more of the senses, must be present in order for thinking to go on. But in recent years observers have been found who report none of these contents as significantly underlying their thought processes, and yet who think, not only much and often, but in some of the cases with unusual cogency and brilliance. The suggestion has therefore been made that in addition to the familiar sorts of meaningful mental content there are pure or imageless thoughts which have no direct sensory basis.

Now in the drowsiness hallucinations and in dream states we have clear cases in which objects are thought of and experiences referred to, which are not actually present or in process. Is it possible that a closer examination of the composition of these vague and fleeting experiences may make somewhat clearer the nature of thought as it ordinarily goes on in waking life?

VICARIOUS FUNCTION IN THINKING

Without disputing the existence of these imageless thoughts, the nature of which is, however, not unquestionable, it may still be pointed out that many of the cases reported as imageless thinking may, as a matter of fact, not be imageless at all. It is possible that the failure to detect sensory elements is due to the fact that the observer is looking for what he considers *relevant* material. This, if of an imagery sort, would be more or less directly and obviously related to the end processes between which the relation reported is objectively or socially felt to exist. *Irrelevant* imagery easily escapes detection and report, as do present perseverative impressions or even other direct sensory materials which might easily enough be carrying the thought forward.

The writer's own introspection, in attempts to test the matter, has usually resulted in the observation of thoughts which seem to stand midway between the conventionally customed idea and the nude relational processes which are said to flow through the consciousness of these imageless observers. These are thoughts which possess no decent apparel of their own, but which nevertheless make effective headway in foreign garments appropriated or borrowed to suit the occasion. Images and perseverative impressions, even immediate sensory processes from quite irrelevant sources, may often be seen to function vicariously for the end processes of a relation that is focal.

The observations cover three clear degrees or stages of this vicarious activity. The first includes dream states in which images quite irrelevant as to source or quality may be seen to play a metaphorical or symbolic rôle in the play of meanings, relations, and complications of situation which make up the plot of the dream. The second stage is an intermediate one, disclosed by observations of drowsiness hallucinations, a stage in which the thought processes may comprise sensible and adequate waking affairs, although the sensory content of consciousness may be evident dream material, or even actual sensory impression of a quite foreign character. The third stage is shown in the common observations that the vehicle of a waking meaning, the two poles of a relation, may be fragmentary, transitory, and only remotely relevant, relevant only by virtue of some accidental association.

A typical example of the first stage may be found in *Blackwood's,* 1910, December number. The author of the article entitled "My Subliminal Self" describes drowsy and dream experiences illustrating clearly the process which we have come to know as "substitution." An illustration is to be found in the "playing card" dreams already considered.

With the writer such substitution dreams are frequent. The essential point in this stage is that thought processes, interplay of relations, comparisons, and intentions may go on in terms of sensory contents which could never sustain the same relations in waking experience. Relational activity is uncontrolled and the sensory content is irrelevant —hence the conclusion is likely to be absurd.

The third stage, in which a more or less trivial and accidentally associated image or fragment acts as the vehicle of a dignified and important meaning, is a common experience. Thus in Professor Titchener's consciousness the "feeling of 'but' " is represented by "a flashing picture of a bald crown, with a fringe of hair below, and a massive black shoulder, the whole passing swiftly down the visual field from northwest to southeast." Students habitually report that the only sensory component of their idea of "justice," the meaning of which is purely relational in character, is the image of some fragment of statuary, drapery, balance, carpenter's square, etc. The essential thing about this stage is that while the thought is sane and adequate, its clothing need not be a piece of photographic imagery. It may possess no intrinsic relevance whatever and yet suffice to carry thought forward, to bear up the relation, to possess meaning, and so on. And this sort of thinking, in which relations are controlled by preliminary purpose or set, and in which the imagery need be relevant only in an extrinsic way, results in safe conclusions.

The second or intermediate stage is a curious one in which, although the relations are controlled or determined by some waking set or task or intention, the sensory contents which introspectively sustain these relations may be drawn from any field whatever—may not be even associatively relevant, and yet the conclusion is sane and is later transferred entire to the situation and objects which originally determined the relational set.

Cases which we have already cited in the study of drowsiness may be used again in illustration of this second stage. The reader is therefore referred at this point to the two observations given on pages 55 and 56. Both cases are from drowsy experiences reported on shipboard: the first concerned with an experimental technique, solved in terms of perseverating checkers; the second concerned with the purchase of a suit, thought out in terms of the swish of water heard through the porthole.

In both these instances perfectly rational, sensible thought process was in progress, relations were felt and examined, and judgments passed. But the meanings were represented or sustained by logically irrelevant sensory contents, which were in neither case simple images. In the first instance it was perseverative impressions of the men on the checker board, in the second the immediate auditory sensations that constituted the substantive points between which transitions were made and relations felt to exist.

These three chief stages seem to be only degrees of a common process, the principal characteristics of which are as follows:

1. There is a forward movement of relational consciousness—comparisons are made, positions, attitudes, bearings, consequences—in fact all manner of relations are handled, relations which exist between the genuine objects of experience.

2. These objects are not relevantly represented by imagery contents. At least in so far as the perception of relation goes they are not represented as the poles. They may, however, have been present at the very beginning to initiate the process and give it a determining direction.

3. Their place is taken by any content, revived, perseverative, or immediately sensory in character, which happens to be easily available at the time. These processes, by a sort of substitutional rôle, come to represent and impersonate the objects between which the relations, as socially recognized, would be said to hold. They carry out the thought, become the vehicle of influences, forces, and significances which they do not intrinsically possess.

4. Conclusions reached in terms of these vicariously

functioning processes are transferred directly to the actual objects or experiences which originally set up the thought process and which may have been in consciousness in some sensory or revived form when the forward movement began.

5. A fair conclusion would be that the feelings of relation, depending, as they perhaps do, on centers associational in their function, are not quite naked processes—that association centers can function only in an active associational way, between two end processes, but that the precise character of these end processes and the cortical location of their corresponding areas are immaterial so long as the goal of the process, its tendency or direction, has once been set.

Just as in logic a relation presupposes substantives which are related, so in psychology the consciousness of relation implies the presence of sense content of some kind or other. Association areas, the activity of which may underlie the feeling of relation, do not initiate their own activity. Just as a relation involves related things, so association tracts function only as connecting lines between sensory or sensory and motor centers. The curious thing, however, is that any pair of sensory centers will suffice, no matter how irrelevant or derived they may be. The feeling of relation, or the relation itself, may well be the focal fact. This irrelevance of the sensory contents of the relational consciousness is what gives them their elusive character in introspection. The sensory material serves merely as the vehicle, the instrument of the process, and any vehicle will do. And the work of any one content may be taken up at any time by any other process which is available, yet the general forward movement be continuous. In the experience of the writer, present kinæsthetic impressions or motor tendencies logically irrelevant are most frequently the vehicle or garment which plays the substantive rôle in relational consciousness.

Revived processes of almost any sort whatever, or even present incoming impressions, may vicariously function as standard-bearers for any intellectual exploration that may be in progress at the time. Thought may then never be really imageless, nor will it necessarily move in terms of a rigid photographic sensationalism. Thought must have garments, it is true, but it need not rely on its own providence. It is amply served by the charity of the passing moment,—by the vicarious functioning of irrelevant sense content. The validity of such thoughts seems to depend on the appropriateness of the association centers involved in the original set or disposition.

IRRELEVANT IMAGERY

The data on the vicarious function of irrelevant imagery, up to this point, were first published in 1911. In 1912, Koffka[1] in discussing Clarke's paper on "Conscious Attitudes" also called attention to the necessity of considering irrelevant imagery in introspective analyses of thought. He remarks: "It is obvious that analysis meant for the author and her observers nothing else than the exhibition of the sensory contents present at any given moment. . . . These sensory contents may (however) be irrelevant to the thought, or may be the necessary condition of the arousal of the thought, or may finally be the thought itself."

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[1] *Zeitschrift für Psychologie,* pp. 63, 219.

In 1921, Comstock[2] undertook, by a set of introspective experiments, to answer the question "How do we know that any sensory content is relevant or irrelevant to a thought?" She writes: "We started out with the belief that we might find in the analysis of thought-processes a good deal of irrelevant material. We expected to have reported contents irrelevant to the thought concerned. Our task was then to be a determination of the psychological criteria of this irrelevancy. The results of our experiments have, however, forced us to the opposite point of view. They show that, if imagery is present as part of the contents of thought, it is *ipso facto* relevant to the thought." "All of the experimental work has lead us to one conclusion, that *there is no irrelevant imagery.*"

The general validity of this conclusion need not concern us from our present point of view. But we may inquire how such a finding would bear on our declaration that irrelevant imagery does function in thinking. The answer is to be found in a distinction which Comstock very clearly draws at the beginning of her report. "Relevancy," she points out, "may be of two kinds, material and logical. It is possible for imaginal contents to be materially relevant but logically irrelevant to a thought. For example, in reply to a question concerning the number of small boxes contained within larger ones, an O gave the correct answer, 21. When asked to report the imagery upon which this answer was based, he described a complex visual image of white boxes, about six inches square with a grey interior. Logically the grey and the white and the dimensions have nothing to do with the solution of the problem. The boxes might just as well have been red, or have had no color ascribed to them. Materially, however, the imagery was relevant, since for this particular O the meaning 'box' was carried by the particular kind of box described."

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[2] *American Journal of Psychology,* April, 1921.

This distinction is precisely that which we have made between function and relevance. The irrelevance of which we have been speaking is logical irrelevance. And we have pointed out that such imagery as is logically irrelevant may nevertheless function in a vicarious fashion, that is, it may have material relevance. With this distinction in mind, Comstock's conclusion would not read "There is no irrelevant imagery" but instead "All irrelevant imagery functions." Since our only concern has been to point out that some irrelevant imagery functions, we may at least accept Comstock's conclusion as confirming our own.

The study of dreamy states is thus seen to be of interest not only for itself alone, but also for the further understanding of thinking in general. We may consider the dream and the drowsiness hallucination not merely as bizarre curiosities, but as useful instruments in the analysis of more imposing aspects of the mind.

We may indeed carry out a further step in the application of these dreamy states to the understanding of ordinary thinking. In the preceding sections the analysis has shown that original objects or events may be "represented" in thought by practically any other contents, functioning vicariously. Not only may we think sensibly in terms of relevant images, conventional words, and standardized gestures. The most miscellaneous details—imagery fragments, perseverating impressions, current sensations—

may stand for, represent, symbolize, or mean more portentous primary objects. This we call the vicarious functioning of content.

But, after all, the selection of these symbolic items is not entirely random. There must be some explanation of the fact that perseverating impressions of checkers, for example, are utilized in drowsily considering the relative merits of two laboratory techniques. Why do these particular items function vicariously rather than others, equally available?

The fact seems to be that it is because of certain convenient relations which these items display that they rather than others assume the vicarious rôle. Most, if not all of our thinking, is *of* relations, *by means of* related symbols. Now the observations show that relations may function vicariously, even as do the contents or terms. It is the symbolic appropriateness of their present relations that determines the choice of the vicarious symbols as vehicles of meaning. Drowsy and dream states reveal so clearly this symbolism of relations that we shall next consider in some detail the general bearing of this fact on the psychology of thought.

CHAPTER XI

SYMBOLIC RELATIONS IN THINKING

> The task would be infinite, if we could establish no principle until we had previously unravelled the complex texture of every image or description to be found in poets and orators. And though we should never be able to reconcile the effect of such images to our principles, this can never overturn the theory itself, whilst it is founded on certain and indisputable facts. A theory founded on experiment, and not assumed, is always good for as much as it explains. Our inability to push it indefinitely is no argument against it.
>
> EDMUND BURKE

In theories of thinking, much use is made of the symbolic value of *contents*—images, words, movements, postures, or special and organic sensations. Such contents are said to *represent* the original perceptual experiences, and to constitute the stream of thought as distinguished from the field of original impressions. Thus a certain sketchy visual image is said to "mean" St. Paul's; the word "box" is said to be substituted for the original object and to function in place of it; eye movements to right and left, respectively, represent different primary alternatives.

THE SENSATIONALIST ACCOUNT

The sensationalist account of the "consciousness of relation" seeks also for sensory or imaginal data that stand for or "carry the meaning" of those relations; which relations are likely to be described, then, as "merely logical," not as conscious elements. Thus Washburn suggests that the "feeling of but" was originally "a certain suspended, baffled motor attitude," and that our everyday feelings of relation (as thought) are "remnants of remotely ancestral motor attitudes, and they resist analysis now because of their vestigial character." [1]

In this vein Titchener insists on a "sensational reading of the relational consciousness," and is inclined to find the sensational basis to be usually an "attitudinal feel." "I act the feeling (of relation) out, though as a rule in imaginal and not in sensational terms. It may be fleeting or it may be relatively stable; whatever it is, I have no doubt of its kinæsthetic character." [2]

Now at least one difficulty that many people have in accepting this account seems to lie in the fact that after all a "quiver of the stomach" [3] is not a relation, nor is a posture nor an "attitudinal feel" a relation. And of course Titchener does not really mean that they are. They are the "signs" of a relation, the "carriers" of the relational meaning, perhaps. And there is no a priori reason why a muscular twitch or a visual quality should not represent a relation, without being one. In just the same way a word, which has no legs, may represent a quadruped. If a sensory item or an image has been sufficiently well associated with a relational situation, there is no reason why the part should not function for or stand for the whole, and this is the basis of all "representation." The objection to the sensationalist account is in part due to the old-fashioned prejudice for "thoughts" that would approximately "copy" their originals. Such duplication is usually ascribed to the image.

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[1] "The Term Feeling," *Journal of Philosophy and Psychology*, 1906, p. 63.

[2] *Experimental Psychology of the Thought Processes*, pp. 185 *ff.*

[3] *Ibid.*, p. 179.

But it does not therefore follow that the sensationalist account is adequate, and this account is, as a matter of fact, still full of obscurity. A large part of this obscurity and inadequacy is due to the structuralist's phobia for relations. He has to admit that there *are* relations, in what he calls his "meanings" (these are purely logical, whatever that means), or among the actual objects or "stimuli" (whatever that may mean). But he dreads to find them in his "consciousness" (whatever that may be). There he hopes to find only sensory units, with such attributable qualities, intensities, durations, and clearness as cannot be denied them; with perhaps a coercive patterning and sequence under the influence of attention (whatever that is); and with a few deprecated affective elements (that do much to spoil the beauty of the system).

RELATIONS AMONG SYMBOLS

Now the fact is that not only do manifold relations exist among perceived objects and original sensations; manifold relations also exist among images, feels, postures, kinæsthetic and organic sensations, such as, in memory, imagination and thought "mean" the original experiences, objects, or situations. These relations between "symbolic" contents are themselves always "fresh" or primary relations, immediately apprehended or known. They have not been accorded a systematic status proportionate to their actual utility in thinking. There seems to be abundant evidence that these primary relations between "symbolic" contents are themselves often utilized as symbols for other and earlier primary relations between the original objects.

Such symbolism need not be of the "copy" sort in the case of symbolic relations any more than in the case of "secondary" or "representative" sensations or images. The present contents that "mean" a series of tones may be visually imaged dots, or actual gestures. The tonal *relations* comprising the original musical phrase may be represented by actual spatial relations of the imaged dots, or by intensive and temporal relations of the actual innervations. Just as a "tonal meaning" may be "carried by" a visually imaged spot, so may a melodic relation be "carried by" an actual space relation of such images. The chief point is that, although the original "qualities" may be represented by "secondary" data, the original relations are often represented by other primary or "fresh" relations.

So, in Washburn's case, the "feeling of but" did not consist of the kinæsthetic qualities of the "baffled attitude." Instead it consisted of the relational aspects of the movements involved. The "but" is not in the "motor attitude" but in the "baffled." This "certain suspended, baffled" is a primary relation, immediately perceived in the kinæsthetic data of the moment. The gestures in turn represent, secondarily or symbolically, various primary or original alternatives—roads, people, foods, books, or what not. This is what makes them "mental." In my experience the "fresh" relation now apprehended among or between these "symbols" also "represents" the original relations apprehended among or between those objects.

That this situation often leads to very bizarre results cannot be denied; but this is true of all "symbolism."

An originally apprehended auditory similarity may be represented "in thought" by a later but originally apprehended visual superimposition; an original moral uncertainty by a present motor hesitation.

But to conclude that the originally perceived relations are represented by the sensory or imaginal details of the present instant is a grotesque fantasy. It is the new primary relations that mean the original primaries, just as the "revived" imaginal contents or the new kinæsthetic sensations may represent the original primary objects or qualities.

In earlier sections on the "Psychology of Drowsiness" and on the "Vicarious Function of Irrelevant Imagery" we have already called attention to this situation. But since in those sections the emphasis was on the large repertoire of available "content" symbols, the symbolism of relations was not given adequate recognition. It is this point that is now to be elaborated.

When the choice between two pieces of apparatus is decided, in drowsy reflection, in terms of movements of black and white checkers on an imaginary checkerboard, two kinds of symbolism are involved. In the first place, the original objects (apparatus) are represented by "fancied checkers." In the second place, the *relations* of these objects are also represented, and represented by the *present* relations (of station and movement) of these symbolic and (materially but not psychologically) irrelevant "images." The rival claims are represented by the "confronting" and by the opposite directions of movement. The superiority of apparatus *A* is represented by the present movement relations in which fancied Black jumps fancied White and lands in the fancied king row.

Titchener's introspection,[4] to use a notable example, shows much evidence of this symbolic use of present relations. *Why* does he "like to get a problem into some sort of visual schema"? We may be sure it is not merely because "meaning is carried by all sorts of sensational and imaginal processes."[5] Instead, it is because primary relations are symbolized only by other primary relations, and in his particular case it is the spatial relations of a visual scheme that best serve the purpose. And these relations, be it noted, are neither "sensational" nor "imaginal." They are strictly *relational* and are *in consciousness,* just as much as are their sensory and imaginal terms.

It is the relative fewness of the actual relations that can be found between given images, words, gestures, postures, organic sensations, and other symbolic materials that has led to the neglect of their reality and their cognitive function. One "muscular tension" can scarcely be "superior to," "more beautiful than," "more expensive than," or "an uncle to" another "muscular tension." Such symbols can be related temporally, spatially, intensively, in terms of definiteness, however. If, then, one is to *think* in muscular terms rather than in visual imagery, auditory speech, or vocally, all possible relations must be symbolized in terms of these few kinæsthetic relations. Perhaps *may* be so symbolized would be a truer statement, inasmuch as it has not yet been denied that a sensory or imaginal item *may* also represent a relation.

There is no reason to suppose that, under the specifying influence of determining tendencies and contexts, this feat cannot be performed (symbolization of all relations in terms of kinæsthetic relations), in spite of the familiar objections that there are not enough discriminable movements. Neither are there many letters in the printed alphabet. But they suffice. The average individual, it would appear, must be able to orient himself relationally with a considerable repertoire of content symbols. Furthermore, if he is on the lookout for visual imagery, it is not unlikely that he will symbolize relations in other terms. This would enable him to reserve his visual imagery for purposes of observation, much as an angry mechanic thinks with his hands and tools, reserving his speech for more expletive purposes. There is reason to suppose that relations will usually, or at least often, be represented in contexts that are not explicitly under observation.

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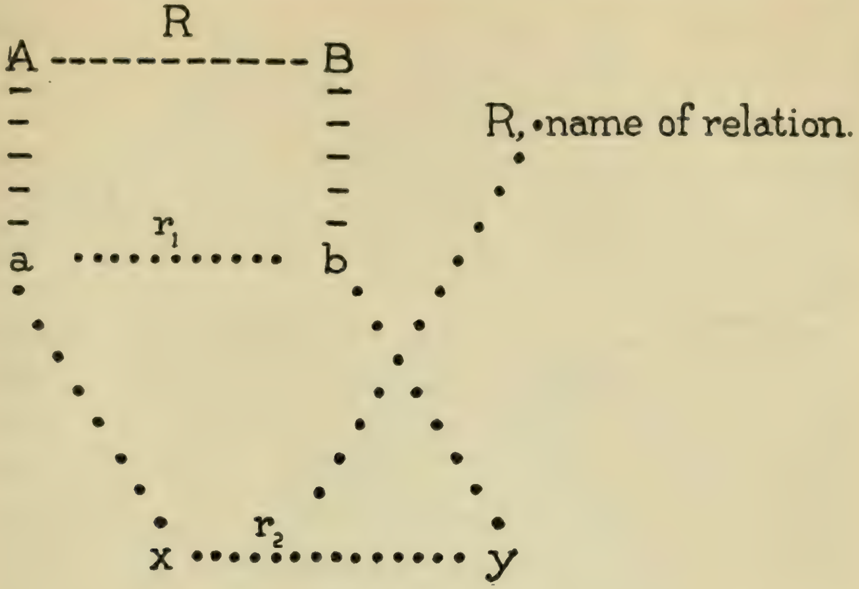
[4] *Ibid.,* p. 10.
[5] *Ibid.,* p. 178.

ANALYSIS OF THINKING

This is why the "consciousness of relation" is so often reported as existing "without any terms." The following diagram (exemplifying, incidentally, the whole theory) will perhaps make this clearer. Between *A* and *B* is found relation *R*. In memory, let us say, *A* and *B* are "represented" by *a* and *b*, and under special contexts, through a further shift, by *x* and *y*.

Say that *R* is the relation "more valuable"; r_1 is the relation "to the right of" (referring to visual images *a* and *b*); and r_2 is the relation "more intense than" (referring to movement innervations *x* and *y*). Ask the subject to "Think of *A* and *B* and their relation" and to report his imagery. His visual imagery, under this constraint, may behave in any possible way, or he may have none to report.



Yet he is thinking of *A* and *B* and *R* (in terms of *x* and *y* and r_2). But *x* and *y* are given the *names A* and *B*. Also, when asked to report, relation r_2 is *named R*. "There was just a *Bewusstheit* of *A* and *B*, given in *unanschaulich* terms, but accompanied by a distinct awareness of their relation *R*. I was not *conscious* of *A* nor *B*, but just of their relation. My knowledge of *A* and *B* was a mere 'reference'," and so on.

That is to say, in whatever *terms A* and *B* and *R* are thought, the naïve observer, *when set talking,* will *call* his terms *"A"* and *"B,"* and the relation *"R"*. The "trained observer" is more likely to discover the symbols which stood for *A* and *B*, and to report them, probably as *a* and *b* (images) but he may not find any relation between these to report except perhaps by naming R, as did the naïve observer.

Or, if required to dwell on *a* and *b*, the outstanding relation will "come to naming" (protocol) as *R,* and he will be accused of "stimulus error." To avoid the "stimulus error" means, then, only "stay among your symbols." But since the term-symbols are often secondary (imaginal), the relation-symbol (which is some other primary or "fresh" relation) is likely to be either overlooked or else reported as mere "knowledge of" (that is, merely named).

Thus we get the two classical schools—the sensationalists, who do not report the relation, and the pure-thoughtists, who report it by its original or primary name. Personally, when I observe my thinking, I invariably find relations. But the relations are never secondary relations; they are always immediately apprehended ones. They occur among term contents that are recognizably redintegrative, that is, meaningful or symbolic. And I have come to see that they are in many instances also, as primary relations, redintegrative or symbolic for other primary relations.

Under the *Einstellung* of this experience, then, I always find relations in thought. But they are not sensory or imaginal. Neither are they bare. They are always just what they are—relational. And when I find them among symbols instead of among original events, I report them as "in consciousness" rather than in the world of things. When found, they may be seen to be themselves symbolic. Or they may not. The same is to be said of the *contents* among which they are to be found, since some details even of these *contents* may be not only materially but also psychologically irrelevant to the trend of thought or action.

THE PROBLEM OF MEANING

Only on some such account as this can one even begin to comprehend what the structuralist means by "carrying meaning." If meanings are relations, then one can understand that the relation of x and y, which they may be supposed (through a further symbolism) to "carry," represents or functions for another relation, namely that of A and B. But such terminology is uselessly obscure, and it is better to say that x means A, y means B, and r_2 means R. As parts, that is, they function, under the redintegrative mechanism for their previous wholes ("contexts" is not good, for in so far as they *were* parts they now function for themselves as well as for their *contexts*).

With this rendering, then, the objection is only to the structuralist's assertion that meaning is always *logical*. Of course, one way to escape relations in psychology is to call them logical and to wash one's hands of them. But if psychology is to be even just an analysis and description of consciousness (and one can see some merit in this asceticism) it must account for relations, for they are found in consciousness. At least, they are found wherever the "elements" exist. That is, they are not only present in perception, but also in memory, imagination, and thought, or, if you prefer, among memories, images, and thoughts. They are, as found, sometimes symbolic but always primary, not "revived." The so-called analysis of them is merely a re-finding of them or of their surrogate relations, among other contents, on a more obscure plane of symbolism.

As a matter of well-known fact, experimental literature is full of reports bearing out this account. In some cases the symbolic function of relations is, through daily habits, become so inveterate that relations of one sort are represented by other relations as automatically as they are named. Even the naming of relations often suggests the basis of the transfer. Pitch relations, thus, are named as higher or lower, and are usually spatially represented. But the experimental facts have either not been fully appreciated or else they have been minimized in the support of systematic prejudices.

JUDGMENT AND COMPARISON

Nothing in the history of psychology is more amusing than the structuralist studies of comparison. Here relations are a priori involved. But they are invariably eluded. Thus, comparisons of tones are not shown to involve response to tonal relations themselves. Instead they are said to be based on schemata involving visual stretches and positions, perhaps. But studies of visual space in turn deny that these visual relations are immediately apprehended. Instead, they are based, say, on muscular strain and kinæsthesis. In turn, in studies of strain comparisons, as in lifted weights, judgments are held not to be direct, but to be based on, let us say, the time relations of the lifting movement. And studies of the time sense, pursuing the fashion, never discover temporal relations, but point, characteristically, to the inferential use of relations in some other field, perhaps the discreteness or overlapping of auditory impressions, or the organization of strains and tensions.

If we could only, finally, reduce the perception of these temporal relations to pitch discriminations, with which we began, we might get along without any relations at all, having completed the circle without the necessity of them. But this slight segment of the circle the sensationalist leaves open, and through the gap all relations are driven precipitously down a steep place into the sea of logic.

At this point Woodworth and others have done valiant service in insisting that qualities are easily dispensed with or taken lightly, but that relations are "the one thing we don't have anything else but." The only complaint to be made of these accounts is on the grounds of their lax discipline in permitting these relations to go absolutely bare. This lack of terminal clothing only encourages the sensationalist to deny them even a body, to make mere logical structures of them.

Why not, therefore, observe that the relations are not strictly bare, but are "amply clothed by the charity of the passing moment." It is only this habit of constantly changing their clothes that gives the impression of nakedness.

Strictly speaking, relations are as a rule present in consciousness. They are, however, always primary, and may be symbolic. Kinæsthetic imagery has often been questioned, as being perhaps always actual primary sensation. But of relations there can be no doubt at all. They are not derived nor secondary, but always hold between contents or terms. The terms, whether images, impressions, or feelings, whether words, gestures, or postures, may not only exist in their own right, but may also function symbolically or redintegratively in the flow of thought and action. So also may the relations they sustain to one another. They may represent, without, however, copying, previous primary relations. And they may function as redintegrative determinants in the flow of thought and action.

Much has been made, in recent years, of the symbolism of dreams, and much of what has been said in this connection has been arrant dogmatism concerning *what* the dream contents and configuration mean. It should be clear that our insistence on the symbolic function of relations and the vicarious function of simpler items does not commit us to these extravagancies of the school of psychoanalogy. That terms and relations function vicariously is the law of all thinking, in so far as "thoughts" are to be distinguished from "actions." The drowsy and dream states merely serve to exhibit this law in more bizarre and, for some purposes, more impressive form.

Stated in very general terms, what seems to be the case is that relations represent patterns or structures which can easily be transferred from one set of items to another, thus illustrating what Von Ehrenfels many years ago called the "form qualities." In more recent years the so-called "*Gestalt* psychology" has laid special emphasis on this fact, both experimentally and theoretically. Especially in the writings of that vigorous group headed by Wertheimer, Koehler, and Koffka these structures and configurations play an important part in the account of mental phenomena.

It is worth while noting that this is, as a matter of fact, a very old doctrine. It is found, for example, in the relational thoughts and the transitive states of James; it is foreshadowed in the doctrine of "creative synthesis" associated with Wundt; it is definitely stated by Mach and elaborated in some detail by Von Ehrenfels; it is at the basis of the very considerable literature on "funded contents" and "objects of a higher order" of the school of Meinong, Witasek, and Cornelius; it was definitely stated in the earlier experiments on reading, as when Cattell studied the relative perceptibility of isolated letters as compared with total words; Woodworth's "features" and nonsensory components of perception insisted upon just such structures; and in the writer's early study of *The Inaccuracy of Movement* occasion was taken to show that patterns, structures, or configurations underlie the reports of speed of movement and of extent of movement, which lose their significance when these total structures are reduced to an enumeration of their sensory components. Relations and structures are encountered and reported in the same direct way as are sensations, images, feelings, and other supposed "elements" of experience. This will have important bearings on some of our subsequent conclusions.

"Itemed relations" are no less genuine than "related items." "Grounded relations" should not be overlooked in exclusive favor of "related fundaments." The unit of discourse, as the "form" psychologists so pertinently point out, could better be described as the "structure," which tacitly involves both the fundaments and the relations which abstraction may be able to indicate.

PERCEPTION, JUDGMENT, INFERENCE, AND BELIEF

With these facts in mind it is possible to indicate various modes or patterns in the thinking process, and to identify these as the various acts ordinarily recognized in logic. A full development of this topic will occupy us in another chapter, but a brief indication will be useful at this point. Psychological attempts to describe the characteristics and differentia of perception, judgment, inference, and belief have not been very successful. For one thing they have in the main sought for some content or contents which might through its or their presence identify these acts. Failing in this search for identifying and differentiating contents, the tendency has been to assert that these acts or processes are not psychologically different, but represent only degrees or stages of some single mechanism of thought.

Consider, however, the following suggestions. Items consciously encountered may be qualities (terms), or relations, or structures, or events. These may function for themselves, or they may function vicariously for larger wholes. Each and all of these items may be encountered, trusted, organized, or construed. The distinctions may be illustrated most readily in the case of relations, since it is with these that traditional logic has been most concerned. Judgment, for example, has been repeatedly defined as the affirmation of a relation.

But relations may be asserted in at least four ways (not to include mere guessing). They may, in the first place, be directly and immediately encountered or apprehended, as when, in hearing two tones, I note their succession. This direct encountering of relations may well be named perception.

Again, a relation not directly encountered may be asserted on the ground of another relation which is so encountered. Thus I may assert that one object is higher than another because it requires a greater effort to reach it. Relative strains thus may symbolize relative distance. Such a method of asserting relations we may well name judgment. One relation, not encountered, is affirmed on the basis of another relation that is immediately perceived.

Or, a relation may be affirmed on the ground of some datum not itself a relation. This datum may be the occurrence of some simple item, such as a quality. Thus the "sameness" of two tones may be asserted because of a certain "warmth" or a peculiar "huddle" accompanying the second. We may conveniently designate this process inference.

Finally, I may maintain that honesty is preferable to mendacity because "the Bible tells us so," or because my best friends so assure me. This is belief—the second-hand affirmation of a relation.[6]

Thus, I *believe* that honesty is the best policy; *infer* the defendant is guilty; *perceive* that water extinguishes that it was colder last night than it is to-day; *judge* that fire. The four processes are not psychologically ambiguous. They represent definite modes of affirming relations when the confidence therein represents anything more than that of a mere guess. These characterizations, moreover, involve the symbolic use of relations, as well as the vicarious function of simpler contents.

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[6] Two further modes of reporting a relation may be indicated, which will be further discussed at a later point. These may be designated "feeling," in which the relation is reported with no clear apprehension of its ground, and "guessing," in which an attempt at indicating the relation is made on a purely chance basis, without even that degree of confidence which accompanies reports based on "feeling."

CHAPTER XII

THE PSYCHOPHYSICAL CONTINUUM

> If an inquiry thus carefully conducted should fail at last of discovering the truth, it may answer an end perhaps as useful, in discovering to us the weakness of our own understanding. If it does not make us knowing, it may make us modest. If it does not preserve us from error, it may at least from the spirit of error; and may make us cautious of pronouncing with positiveness or with haste, when so much labour may end in so much uncertainty.
>
> EDMUND BURKE

THE MENTAL AND THE PHYSICAL

Discussions of the thought processes have a traditional way of beginning with a distinction between mental and physical facts. This is one of the first tasks attempted in the classical discussions of Brentano and Jerusalem, for example. Indeed one of the most firmly entrenched ideas of philosophy is the familiar distinction between the "natural order" and the "mental order." In the words of Marshall, we place in the natural order "the stream of appreciations of the existence of what we in thoughtful reflection come to call objects in the outer world; the chair, the table, the fireplace." But in addition to this stream "there are discovered items which are felt to be of a different order. . . . The three items, warmth, desire, belief, may be taken as typical of innumerable instances of these appreciations of existences which . . .

are usually grouped together as items within what we may call the mental order, or what is usually spoken of as consciousness." Such remarks clearly suggest that there is a real gulf fixed between these two orders, and that the existence of this gulf constitutes also a barrier between the study of behavior and the study of consciousness. This is, indeed, the conventional tradition known as dualism.

But this whole matter may be much simplified by recognizing the relative and statistical character of the distinction, and by noting that there is, as a matter of fact, not a gulf but a gradual transition and continuity between the two so-called orders. It is true that in daily conversation and also in common psychological classification we emphasize the physical as opposed to the mental, the cognitive as over against the affective and conative. But so also do we distinguish between black and white, long and short, and between various other ends of continuous series. Psychological classification, and hence both psychological and epistemological theory, have suffered from the uncritical acceptance of purely convenient and practical distinctions, based in part on the statistical features of the experiences indicated, and in part on the manners of their intercorrelation as events. Epistemology will be relieved and psychology clarified by having the points noted, even if in a naïve and amateurish way, unembellished by metaphysical vocabulary and technicality. The sharp distinction between the "stuff" of dreams and that of "reality" represents a similar gulf, which we have, in preceding sections, been interested in bridging.

To begin with, objects constituting the natural order are put there chiefly because of the universality or the consistency of their occurrence. When one of us experiences table, fireplace, or similar "object," and our fellows are interrogated, a universal affirmative verdict is assured —all or nearly all of them report the same experience. Or, on different occasions I myself continue to report it. At least the conditions required for such a verdict are rather easily satisfied; it requires merely that a light be turned on, that a curtain be withdrawn, that attention be redirected, and so on. But when I report the presence of desire, belief, emotion, and interrogate my fellows, the affirmative reports are likely to be fewer. I may be alone in my testimony, I may receive the confirmation of a few intimate associates, or, indeed, a fairly large group may agree with my report that "Anger is now experienced" or "There is hunger." But the verdict is far from universal, and it is, furthermore, difficult to arrange the conditions for such an universal verdict, if not indeed impossible. It may, for example, require a long course of neurotherapy or psychotherapy.

Sometimes, indeed, when a closed circle of associates is concerned, an emotion, a desire, and the like, may be universally reported. On such occasions the reported event takes its place in the natural order and is designated by an object name, as The Holy Ghost, The Spirit of the Lord, "a wave of patriotism." As William James remarked, "Sameness in a multiplicity of objective appearances is thus the basis of our belief in realities outside of thought. If but one person sees an apparition we consider it his private hallucination. If more than one, we begin to think it may be a real external presence."[1] This is particularly true when the experience is not of the routine sort, but depends on some rather rare condition or set of conditions. The fever, the plague, beauty, are other illustrations. Such experiences are given full objectivity in our table talk, in economics, history, and sociology. The plague "is spreading," "is being combated." The fever "is identified," "is restricted to a certain area," and so on.

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[1] *Principles of Psychology,* Vol. I, p. 272.

Disease entities, in fact, complexes of "pathological" experiences, very nicely illustrate the transition region between the natural and the mental orders. The reason for this is obvious—it is usually fairly easy to effect the conditions requisite for a universal or widespread report of symptoms. Medical prophylactics is mainly engaged in maintaining a set of conditions which will justify us in classifying the various diseases as objects of the mental order. Religious zeal of a certain kind, on the other hand, is chiefly engaged in perpetuating or reviving conditions which will induce us to classify various "emotions" as objective existences in the natural order. This is the conflict of "realism" and "nominalism."

Thus the equivocal status of "disease entities" is neatly illustrated by Crookshank's contention that "under the influence of certain schools of thought, and certain habits of expression, we have become accustomed to speak and write as if a disease were a natural object," whereas "no great advance is probable in the domain of Medicine until the belief in the real existence of diseases is abandoned." It is this intermediate character of the disease entity that leads the same author, in writing on "influenza," to remark that "today the Scholastic Nominalist is represented by the sceptic who says 'Influenza' is only a name, and the

Scholastic Realist by him who teaches Influenza to be a 'morbid entity'."

Æsthetic experiences, again, easily come to have objective character, because such large groups of observers report identical objects and events. Thus, beauty, ugliness, sublimity, harmony, pathos, are not classified as peculiar modifications of the self, as are anger, fear, and perplexity. They are easily conceived as properties of objects and assigned existence well down toward the "natural" end of the continuum of experience. Only an international experience suffices to convince one that the beauty of a given art form is not as intrinsic and fundamental as is the resistance of a solid object, or the brilliance of a pencil of homogeneous light rays.

THE NATURE OF RELATIONS

The controversy over the nature of perceived relations is especially significant here. On the one hand, we are told that relations are purely subjective, that they are the product of a relating activity which establishes a psychic bond between the members of a pair or couple; or that relations are only feelings, feelings of transition experienced in the shifting of attention from one object to another. Or still more extremely we are told that relations between objects in general are never perceived but only relations between accompanying or secondary experiences, such as the strains of attentive effort, the shifts of kinæsthesis, as if one could eternally avoid the reality of one relation simply by taking a resolute stand on some other relation.

On the other hand, we are told, as by Woodworth, that the attempt to take the idealistic attitude "succeeds pretty well so far as concerns the sensory and conceived qualities of objects, but not at all as concerns their relations." Or by Dunlap that "real relations of real objects are really perceived"; that "relations, activities and lamp posts are things which are known, and consciousness is the knowing which is involved in that statement." Or, in still greater detail, Brunswig affirms that relations have actual ontological existence, objective in the same real sense that other things are objective, and that they cannot be treated as the mental web spun by the mind about and through an atomistic world.

How now are these equally honest reports to be reconciled? From our point of view the controversy presents no special difficulties, for relations are to be found occupying all regions of the psychophysical continuum. There are relations, such as those of position in space, temporal sequence, organization, similarity, identity, difference, equality, that are just as stable and just as universally reported as are the objects between which they subsist. There are also relations, such as those of value, preference, sympathy, interest, that are just as variable and just as individual as are desires, beliefs, emotions. Still further, there are ambiguous or equivocal relations, such as those of fitness, completeness, perceptual pattern, temperature and harmony which are as uncertainly placed as are beauty, disease entities, and social phenomena.

Relations, in other words, are occurrences or events, and are objective in the same sense as are the objects on which relations may be established. But they may be either more or less objective than the particular members between or among which they subsist. They may be physical or psychic or anywhere between these two extremes of the continuum. The only generalization that can be made to include them all is that they and all other contents or objects of thought are events.

Analytical psychology, again, in its attempt to pigeonhole those experiences which are mainly toward the "mental" end of the series, gives us such rubrics as feeling, belief, judgment, perception, and in the past has tended to assume the existence of certain qualitative differentia between the experiences thus named. But it should be noted that every "introspective" attempt to formulate the earmarks of the variously named experiences has resulted in failure and in the conclusion that all these experiences merge into one another; that, in fact, in Marshall's words, consciousness is "a complex of diverse emphases within a whole psychic pulse" and that "in so far as these emphases display observable characteristics, the average man gives them special names, *e. g.*, 'thoughts,' 'desires,' 'believings,' 'emotions,' 'sensations,' etc." We shall deal further with these difficulties in later chapters.

FUNDAMENTAL TYPES OF REPORT

As a matter of fact, the observable characteristics, so far as used in psychological classification, are chiefly statistical. Thus I am said to "perceive" an object, a difference, a relation, when the greater part of the total distribution of observers or observations yield a similar report. I am said to make a "judgment" of difference or of what not when the verdicts, either of other observers or of my own repeated reports, are frequently contradictory. Sometimes, to be sure, another factor is considered, namely, the degree of confidence of the report—that is, the briskness of formulation, the speed with which the object or situation develops, and the clearness or intensity which it finally displays.

Thus when a visual object develops quickly and in an orderly manner and when motor adjustments, in the form of handling, naming, and the like, develop in a definite and standardized form, I say I *perceive* an object. And this is chiefly on the basis of the fact that in the long run I have found that this sort of an object or situation is one which will be universally reported. But if the object develops slowly or irregularly or if the handling or naming reactions are uncertain or uncoördinated or novel, I am likely to say "I *feel* it" to be such and such an object, "I *judge* it," "I *believe* it."

Thus, in laboratory experiments on the differential threshold, various degrees of confidence are likely to be reported in some such way as the following:

D. If the difference is exceedingly small, so small that its direction is not evident, although its existence is suggested, the observer is likely to report that he *feels* a difference.

C. If the difference is increased somewhat, not only will the existence of a difference be reported, but its direction will also be asserted, though the observer reports the direction not to be absolutely constant, but to vary from moment to moment. He may then be said to be *judging* the difference.

B. Increase the difference still more, and the observer will report a difference which continues to have the same direction through successive trials or inspections. He then may be said to hold a *belief* with respect to the difference, a belief, be it noted, which may not accord with the objective conditions because of the presence of certain constant errors or motives to illusion. This is the sense in which Kant uses the word "belief," as meaning "something half-way between thinking and knowing" (Vaihinger). (By objective conditions we mean, of course, only reports of observers who have fuller means of examination and comparison, the concensus of all other estimates. By the "stimulus" we mean only the event as known in some other way, by some other person, or on some other occasion.)

A. A larger difference still will be said to be *perceived,* since it is not only clear, but its direction is consistently reported and coincides with the concensus of other estimates or verdicts or with those estimates which are so universal that they have been standardized as objective.

CONFIDENCE AND ACCURACY

If requested, the observer can easily indicate the various types of report by the four degrees of confidence, *D, C, B,* and *A,* and more degrees than this he will hardly find possible. Furthermore, his various percentages of correctness will be found to be about 60, 70, 80 and 95. Or, if different observers are used and their reports compared, similar differences will be found in the variabilities of their reports. In other words, here we have, in the case of the same general situation, four distinguishable types of report, which we name, respectively, feeling, judging, believing, and perceiving. They are distinguished from one another, in this case, only by the universality of their verdicts.

In the same way we never say that an observer judges the sun to be rising, or feels or believes it to be rising, unless he is reporting under circumstances which would produce varying reports from different observers or from the same observer in different trials. So also, one *perceives* that water extinguishes fire, *believes* that honesty is the best policy, *judges* that the defendant is guilty, and *feels* that a given blue is more agreeable than a given green. It will be noted that these categories of report are not here used in the sense of the definitions suggested in an earlier chapter. We are here concerned not with the best usage but with a common one, and the discrepancy is, after all, not an irreconcilable one.

It is not uninteresting to note that there is a larger gap, from the point of view of percentage of correctness, between the *A* and the *B* reports than between the other degrees of confidence. This reflects the sharp distinction which we have made in practical life between the natural and the mental orders, between perception on the one hand and belief, judgment, and feeling on the other.

It may be asserted that in addition to these purely statistical differences between these various types of experience, there are other differences of a purely qualitative sort. Thus it is often said, of the feelings at least, that they have a peculiar warmth, intimacy, and personal character, which perceptions do not have, that they are felt as modifications of the self rather than as qualities of objects. It should be observed, in the first place, that such statements, if they are intended as universal propositions, are false. The Holy Ghost is felt to be not a personal modification of the self but a real entity abroad in the land, in the same land where stalk the Panic, the White Plague, the Measles, the Cold Weather, and where are found also the melody, the difference tones, the stars, and the apple blossoms.

In the second place, this personal and private characterization of the affective and conative experiences is but an obscure way of pointing out their statistical limitations, their relative lack of clearness and persistence, and the unfamiliar and unanticipated nature of the adjustments to them. Experiences, to be sure, display many points of difference, afford various categories of prediction. But, along with the differences I have pointed out, they are all thoroughly "natural" differences and should all be treated in the same objective way. The differences do not reveal ontological idiosyncracies. A desire differs in many ways from a joy, and in still further ways from a color. But so does my fountain pen differ in many ways from a whiff of smoke, an itch, an oyster, a glass of lemonade. The Holy Ghost experience, for example, is more like an odor, or a melody, or an itch, than it is like jealousy or hatred.

Diverse as are the ways in which events may differ, various as are the relations which experience may afford, they are all equally natural. They are all, in other words, psychophysical; psychical in so far as they are indefinite, variable and rare; physical in so far as they are definite, stable and common. And it is highly probable that their definiteness is largely a function of the frequency with which they are met. It should be indicated, however, that in the following chapter an additional criterion (of convenience) for the "mental" will be suggested. This further criterion is also closely related to the variability of events, and has to do with the nature of their sequences or correlations. We have already encountered it under the category of redintegration.

THE PROBLEMS OF SCIENCE

The physical world, with which the physical sciences deal, and for which are developed the various shorthand symbols by which we designate objects as independent of report, consists of those events which are statistically common in our reports. The independence of these objects, their stubbornness, their resistance, their objectivity and naturalness, these all are not unique characteristics which suffice to split experience in two. They are merely various and interesting convenient ways of designating the same statistical fact.

The dependence, the subjectivity, the personal character of other events, those of the so-called mental order, are merely literary terms which express their statistical limitations and their consequent vagueness and complex conditions of appearance. (Also, as we shall see later, their peculiar mode of sequence.) The intermediate zone, comprising those events with only average statistical possibilities—the diseases, the communistic sentiments, the fervent local emotions, the qualities afforded by the proprioceptors and by the autonomic and organic systems, such experiences as panic, ague, beauty, warmth, harmony, pathos, form qualities, and many ordinary relations, have been strangely neglected by the classifiers. They are left occupying an equivocal position which is the occasion of much argument concerning their "ontological status."

It may seem strange that in the case of the objects at the one end of the psychophysical continuum we have failed to develop conceptual names, such as are used in the physical sciences to connote the occurrence or possibility of general statistical experience. But there should be no difficulty in seeing why this is true. The same tendency is to be seen among those experiences which we have come to call natural objects. When only one or two catastrophes of a given kind occur in history or in life, we need no general concepts such as electricity, resistance, extension, by which to refer to them. Each receives its Christian name, such as the Burning Bush, the Star of Bethlehem, the Aurora Borealis.

But when such events assume larger statistical proportions, and resemblances are detected, physical sciences develop generic symbols for their reference, and these symbols become, in proportion to their statistical necessities, the eternal verities of reality as distinguished from appearance. In the same way the early apostles, impressed by the locally common experience of a certain religious ecstasy, conceptualized its various occurrences, and the Holy Ghost was born. But for the failure of adequate statistical verification this object would have taken its place along with electricity and the ether as an eternal verity.

When a majority of properly equipped astronomers report the appearance of a new sun spot, no problem is afforded the psychologist thereby. The phenomenon is felt to belong to the physical sciences. But when only one astronomer reports the celestial novelty, and his fellow observers, under the same general conditions, make no such report, the psychologist is at once interested. The event has taken its place in the mental order, with no changes whatsoever in its attributes.

In this sense, and in this sense alone, psychology may be properly defined as the science of behavior. It is the science of statistically variable experience, of those events which follow, in their sequences and intercorrelations, the redintegrative formula. The symptoms of a disease, the manifestations of an emotion, the relational features of various other events, these correspond to the properties or qualities of objects. All sciences are studies of behavior. The subject matter is determined by the statistical facts on the one hand and by arbitrary selection on the other.

We have just referred to a "redintegrative formula" and the reader may have felt long ago that it is time we were drifting back to the type of subject matter that has occupied us in most of our earlier chapters. In the following chapter it will be pointed out that "redintegrative sequence," or "mnemic causation," is one of the chief features of "mental" as distinguished from "physical" events. This type of sequence, in which a partial detail of the antecedent reinstates the total consequent (Semon's law of ekphory, Woodworth's law of combination, and the author's formula of redintegration) is in part a factor in the variability we here consider. Almost *any* detail may show this part-whole efficacy, under given circumstances. Hence results a consequent with a multiplicity of effective antecedents. Individual differences in report are thus not so remotely related to redintegrative sequence as might at first appear to be the case.

THE PHYSIOLOGICAL PREDICAMENT

There remains, perhaps, in some mind, the old riddle presented by the physiological psychologist. The neurologist and brain anatomist point out that those events which we call sensory experiences depend on the peripheral stimulation of certain of the nerves of an organism; that the cognitive processes depend on the elaboration of these nervous processes through their fusion with synchronous processes from other nerves and by the habits imposed upon brain centers by virtue of previous activity. Special cortical centers are involved when we have those experiences which we place in the natural order—the sensory qualities, the objects, the temporal and spatial attributes. The so-called affective, relational, and conative experiences, it is said, do not depend on such specialized centers. They arise in some way from the interrelation of these various mechanisms and their correlated motor paths of egress. They are generated not by physical stimuli directly but reflect merely the condition of the organism at the time, the amount of energy at its disposal, the facilitating or inhibiting relations of neural tendencies, the metabolism of the tissues, the liveliness of the nervous impulse, general tonus, and the like. Hence they have no reference to the natural order, these inner mental experiences; they are subjective and thoroughly illusory if taken to be items in a real world. Pleasures, beliefs, emotions, relations, are tertiary qualities and to be sharply distinguished from the objects of cognition.

Similarly with the secondary qualities, such as color, taste, and warmth. The neurologist reports no trace of color, taste or heat in the impulses that travel inward from the periphery, whether in the nerves themselves or in the intermedia. These qualities, we are told, are secondary and reveal not the properties of the natural world but the way in which the objects of that world affect certain sorts of protoplasm in the cortex. The primary qualities of resistance and extension, and perhaps of change and duration, are the sole experiences that reveal reality. The real world, it is said, is not beautiful, nor is it angry, nor is it even colored or fragrant. These are purely mental qualities which psychology may study, since the other sciences are busy with more important matters.

But certain other considerations must be entertained before we succumb to this physiological predicament, with its metaphysical implications and its psychological conundrums. The fact that objects display certain relations and interrelations which do not characterize such experiences as emotion or desire is on a level with the fact that some objects are organic, others not; some objects positively charged, others not. Many experiences of the natural order do not possess the property of extension and do not easily fall under relations of distance and direction, yet these events are not classified as modifications of the self. A war, for example, or a nation, or a melody, may be cited. That sounds and odors are not as completely objectified as visual and tactile objects is due solely to their greater statistical variability.

Cortical changes, the dance of molecules in the brain, may be requisite for all kinds of experience. Some of these changes are visible, some audible, or tangible, or enjoyable, or desirable, or comparable, as the case may be, to the organism in which the changes take place. But what does it signify if the neurologist discovers that visible experiences of color, for me, are accompanied by visible experiences of dancing cortical molecules in my occipetal lobe, for him? Or that when I am getting auditory experiences he may be getting tactual experiences from the string he has glued to my tympanum?

All that this means is that when one organism has certain experiences, another organism in rather different circumstances gets certain other experiences, makes a different report. Such correlations of experience are common. My failure involves your self-complacency; my joy is correlated with your sorrow; the number of fires in Canadian forests correlates month by month with the number of immigrants arriving at the port of New York; the pleasantness of an odor is a function of its intensity, and so on. Experience is full of correlations, and it is the business of the various sciences to discover them and to record them. Once this is completely done, there is nothing else to do but sit down and take experiences as they come. But—and this is the crux of the whole matter—*the correlation of what we call a mental fact with what we call a physical fact is no more mysterious than, and is the same in kind as, any correlation between two physical or between two mental facts.*

For there is no gulf between psychical and physical, between the mental and the natural orders. It is quite unnecessary to insist on giving up either one end of the experience continuum or the other. It is equally unnecessary to talk about the two extremes as if they were fundamentally and qualitatively different sorts of being, displaying a mysterious and inexplicable dualism, or parallelism, or identity, or what not. All events take their place in the surface of frequency. The differences between them are not matters for mystical rumination, but for such attempts at correlation as those in which the empirical sciences are engaged.

It is to be hoped that in time psychologists will cease to delude the beginning student with easy "physiological explanations" of phenomenal events such as those studied by the introspectionalist. It is no scientific feat but only a bit of nursery magic to pretend to answer one question by hasty chatter about a different topic. To explain why *E* follows *A* by showing that *B, C* and *D* come in between is only to multiply, not to reduce mysteries.

A thorn penetrates the skin and pain ensues. The student asks why pain follows penetration, why a certain pain follows a particular vision, both these being actual events suffered by the inquirer. The psychologist hastens to reply that his observations show a number of other events to have occurred between these two, and thereupon begins his fascinating narrative of the action of the receptors, the axones, synapses, spinal tracts, thalamus, and cortical areas.

The stupid inquirer has his curiosity allayed; the brighter one realizes that now six or seven sequences call for explanation instead of the one with which he began; while the reader will of course discern that the psychologist has only hastily resorted to an inexplicable simultaneity (which he calls psychophysical parallelism) as being more enlightening than the obvious and familiar sequence of visual penetration and felt pain.

"No psychosis without neurosis" was a few years ago the slogan of psychologists, many of whom thenceforth occupied themselves with the interminable game of matching each "conscious fact" with a corresponding "brain fact." But "No psychosis without other psychosis" and "No brain fact without further brain fact" are both as valid as the traditional dogma. To illustrate the former of these consider such simple facts as that every color combination has its reportable degree of agreeableness, every odor its accompanying feeling tone. To illustrate the latter proposition note that every "facilitation" has its correlated "inhibition," every "overflow" its associated "drainage," and every "anabolism" its related "katabolism."

Items-reported-by-the-one may be intimately paralleled by items-reported-by-the-many. But "psychic affairs" are no less closely intercorrelated, and it is well known how closely "physical facts" are connected with one another. The correlations within the two supposedly parallel but severed fields are quite like those between them. Only when this fact is fully recognized will the descriptive nature of explanation be understood and the "great gulf" between psychic and physical be seen in its proper status as a relic of primitive formulation.

Subjective events (such as memory images) may very well be regarded as being dependent, if they are found to be so. But it should not be forgotten that objective events also have their dependencies. Thus the "nervous system" is not given once for all as an absolute or as an intuitively known object. Either it *is* a visual-tactile event reported by others, or it is an inferred object which is *dependent* upon such visual-tactile events. Only in the consistency of its report can it be conceived as in any way less dependent than are the memory images which it is summoned to explain.

SPACE, TIME, AND NUMBER

With all this arrogant resolution of distinctions, the problem of knowledge or of consciousness, it must be admitted, still remains. But it has become in no sense a peculiarly psychological problem. The distinction is no longer that suggested in earlier quotations. It is not the distinction between physical objects in the natural order and conscious events in a mental order. We are conscious of mental events in just the same way that we are aware of physical objects. The distinction which is legitimate is not in the nature of the knowledge nor in the qualitative peculiarities of the events. The question comes to concern only the uniformity of the events, the character of their sequence, and the inferences based upon these features.

The important distinction is simply that between awareness and ignorance, or, more simply still, between presence and absence of experience, between consciousness and unconsciousness. A common prejudice has it that physical events transpire even when we are not aware of them. A somewhat less popular prejudice contends that mental events may go on in the same fashion. Only a further prejudice can lead to the explicit acceptance of one of these ideas and the theoretical rejection of the other. Both require restatement in order to be intelligible.

Among the vagaries of Bergson, there is one suggestion that has an essential significance, a suggestion of which some of the recent British philosophers have made much use. This is the intimation that past events can be approached by a journey into time, just as absent physical objects can be recovered through an expedition into space.

If forgotten mental events survive in time as absent physical objects exist in space, what is the unconscious aspect of those intermediate events which we have insisted occupy that region of the continuum lying between these two extremes—the patterns, structures, relations, the æsthetic attributes, and the like?

It may be suggested that if the eternal category of physical objects is Space and the existential aspect of mental events is Time, so the permanent category of the intermediate field is Number (or Order). Space, Time, and Number are the unconscious aspects of those events with which all the sciences deal. To go beyond them is far beyond the ambition of a psychologist, even of one who refuses to be merely an introspectionist or merely an objectivist.

Even the naïve reliance on "The Unconscious" so popular in recent years aligns itself with this suggestion. The unconscious potencies that play so conspicuous a rôle in what has been called the "new psychology," are (1) past events; (2) absent objects, persons, and scenes; (3) the patterns of symbolization. The Unconscious of the Freudians, in other words, is the natural world—the world of space, time, and number—and requires no new personifying designation. If the question be raised how "the past" can be effective at a later time, without being actively "present" in the unconscious, the reply is simply that in *every* presumed case of "causation" we have the same situation—the past, now gone, exercises a determining influence on the present.

THE PROBLEM OF CONSCIOUSNESS

Consciousness, we have intimated, is not a peculiar stuff, of unique composition. The field of consciousness is the field of symbolic events, and consciousness is the fact of report. The conventional distinction between objects of knowledge and the "sensations" or ideas by which they are known obscures rather than clarifies, and is in the end an invention rather than a description. It gives a sharply defined existential status to a classification based solely on function. The idea of an event, as will be demonstrated at a later point, is an integral detail of that event. To "think of" an event is to be in the presence of some detail of that event which functions redintegratively in the subsequent flow of events. In the case of "consciousness" the subsequent that is instigated is a report or symbol of the antecedent event.

If "ideas" are required for consciousness, it is only because consciousness is the fact of report. In one sense it may be said that all consciousness is perceptual, since there is no reinstatement of past experiences, no recall of past episodes. There is, instead, always a present item, functioning for a past context. This present item (idea or symbol), be it image, word, gesture, attitude, or feeling, is itself and in itself a definite and natural occurrence, as natural as is the larger situation which it is said to "represent."

But in another, and a very important sense, consciousness is always retrospective, in that it involves always the report, indication, designation, or interpretation, by a present item of a past event. Thus, to a singer, the sounds of his voice serve as a report of his vocal movements. That is what we mean by saying that he is conscious of his singing. This is what James meant, when in his search for "the knower" he concluded that each cross section of the "stream" in its turn became the "knower" of the preceding sections. This is what Bertrand Russell means by his statement that consciousness is always a matter of memory. This is what leads Wheeler to say that consciousness is always "interpretation" of preceding datum and Hunter to define it as language response to sensory stimulation. This was the significant fact upon which was based the "relational view of consciousness." For consciousness, as report of past by present item, is a kind of relation, and may be neatly, though figuratively, described in Montague's terms, as a "pointing relation."

Consciousness is thus a phenomenon arising in the natural world, as the biologist requires it to be, and as "functional psychology" demands. It is "carried on" by such natural events as qualities, forms, patterns, changes, impulses, movements, colors, afterimages, pains, distances, processes, objects, and the whole array of those affairs that constitute the content of experience and the topics of thought, reference, and action. Many of these may be "analyzed" into more detailed events. But the notion that such analysis is "analysis of consciousness" represents only the literal interpretation of what is actually but a bit of synecdoche.

Here we agree with Dunlap that "the consciousness of one object does not differ in kind . . . from the consciousness of another object. The only difference (aside from a possible difference in degree or vividness) is in the objects of consciousness. . . . However complex an object may be, there is no possibility of analysing the consciousness thereof. Hence there is no discernible difference between the consciousness of one element and the consciousness of another element."

The following example will further illustrate this conception of consciousness as report. A man, driving along an automobile road, suddenly began to whistle "Where the sweet magnolias bloom." Being interested in psychological topics, he reported this melody to himself by verbally naming it, and wondered why he had whistled it. A few hundred yards further on he read (verbally reported) the legend on a signboard, "Magnolia Manor" of which he had up to that time been "unconscious." That the signboard had prompted the whistled melody seemed evident. But this did not make the sign "conscious," since whistling is not a report. The consciousness of the legend arose later and consisted in the report of it which is ordinarily called "reading." Consciousness thus always involves the interpretation, classification, naming, or report of a previous event. The essential thing in report is that the reaction to the event be itself a symbol or surrogate for that event. Of course, there are numerous modes of report besides verbalization or naming.

PSYCHOLOGICAL IMPLICATIONS

For psychology the point of view here indicated has definite implications. The structuralist's distinctions between the world of stimuli and the world of conscious processes is at once invalidated. Warnings concerning the "stimulus error," distinctions between report of process and indication of meaning, are seen to rest on epistemological prejudices rather than on phenomenological and psychological vision.

The stimulus, for example, in a given experiment, is not a nonpsychological object which the observer can hold in his hand and which the subject knows by intuition or by any intentional reference on the part of other experiences. It is in no sense a physical object to be sharply distinguished from a mental content which refers to or means it. The stimulus can be only an event complex partially described, or considered in but one of its aspects. As Kant intimated (Vaihinger) the thing-in-itself is only "the same thing regarded from another view-point. . . .

Not another object but another manner of becoming the object."

Thus the stimulus in a two-point discrimination test is the visual compass application. Whether the subject report the distance between the seen points (thus committing the stimulus error) or indicate the spatial or intensive attributes of the tactual experience (thus avoiding the stimulus error) is not a difference between reporting a physical object on the one hand or a sensation on the other. It is merely a difference between reporting part of an event or the whole of it, or between reporting one part of it rather than another.

Or, if the dualist insist that there is a distinction between reporting process and indicating meaning, this again is only a distinction between part and whole. If the subject report the part, and especially if he report only that part in which the experimenter happens to be interested, he is said to be reporting process. If he report the whole event, the whole attitude evoked, or if he report a part which is irrelevant to the experimenter's topic of inquiry, he is then said to be indicating meanings. Or still more clearly is this the case if his report is dictated by the participation of the present detail or its like in a previous total event.

To get a meaning, as we shall see more fully in the next chapter, is to react to the partial detail as if the whole were present. The only safe distinction is that the part is a *present* detail whereas the remainder may be a *past* or *remembered* residue. Perhaps the structuralist means that process report is report of present event, whereas report of past or known residue is report of meaning. But even on this ground the distinction fails, since the inevitable temporal difference between event and report implies that processes are always reported from memory. The distinction between report of process and indication of meaning thus resolves itself into distinction between immediate and delayed recall, after all not a sharp nor a fundamental distinction, although perhaps an important one.

There is a belief that the report of the part is more likely to be correct than that of the whole. The ascribed meaning may be in error, and often is. But so also, in all likelihood, is the report of process. The latter has only the greater immediacy of its recall or description in its favor, and we have no checks upon its validity. On the other hand, we have checks upon the validity of the meaning report, inasmuch as the wholes that are "reinstated" are not mere fragments, but are the *types* and the standardized *patterns* which, by virtue of their greater frequency and statistical uniformity, we adopt as the real objects, the physical events, the meanings. Thus we compare "reports" with "stimuli."

The distinction between process and meaning, therefore, or that between sensation and stimulus, is a distinction *within* the field of experience. It is a statistical distinction, similar to that general group of distinctions between the mental and the physical. The naïve distinction between the physical and the mental, the uniform and the variable, has led to the neglect of that intermediate region of the continuum of events to which attention has been urged. In the same way the distinction between process and stimulus has led to the neglect of a significant field of events or types of object, namely, the structures, relations, form qualities, and patterns, which bulk so large in perception, comparison, and judgment, as well as in technical and artistic manipulation.

There have been, in recent years, signs of a structuralist retreat from the original naïve and arbitrary dualism. The rise of the *Gestaltstheorie* in introspective psychology may perhaps indicate the abandonment of the old stimulus-process distinction, and a recognition even in psychology of that fundamental fact which we have tried to suggest by the awkward term, the psychophysical continuum.

A similar movement on the part of philosophers is found in that enterprise which, in America, first became conspicuous in the "world of pure experience" of William James. More recently the neorealists and the critical realists have complicated the terminology and thus valiantly perpetuated the study of philosophy. In the pure experience of James, in the neutral stuff of the neorealists and in the logical entities and the essences of the critical realists, we find only a technical rendering of the psychophysical continuum. The pure experience, the neutral stuff, the logical essences, what are these but indications of the psychophysical continuum, the background of events, within which we draw the popular distinctions of mental and physical, sensation and stimulus, process and meaning?

On the other hand, not all modern movements and agitations are in this direction. For example, that strange product of the publicity impulse, the "behaviorism" propaganda, seeks to evade the philosophical difficulty by a curious subversion. "If thine eye or thy tooth offend thee, pluck it out and cast it from thee." This is the "implicit" slogan of behaviorism and it is the tooth that is rejected. According to this school the only objects comprising reality are visual in nature. Hence visual observation is the only form to be utilized, they insist, in science. If other than visual objects do perhaps exist, they are, at least, to be studied only through their visual manifestations, or through correlated visual phenomena. Only with reluctance is there occasional permission given to take advantage of auditory observation as well as visual, as in the occasional noting of cries on the part of lower animals and speech in the case of human beings.

Thus if, with my arm, I execute a gesture, the behaviorist may study it as a movement, visually apprehended by him. The fact that I also apprehend that gesture, not through vision alone, but also through the avenue of kinæsthetic sensation, the behaviorist ignores. The movements which are correlated with a toothache may be studied by behaviorism, but the ache itself, as an object of another sort, must not be mentioned! For this would be introspection! This would be to admit a world of objects not directly accessible to the investigator, whose eyes are nimble but whose teeth are sound. And thus it would seem that if there were a thoughtful behaviorist he would find himself denying psychologists the right to observe smells, tastes, pains, and the great array of thermal, tactual, and kinæsthetic objects, simply because these objects cannot be *seen* and will not inscribe themselves on smoked drums.

This restriction of the world of legitimate objects to those of a visual character (in the main) seems, as a matter of fact, to constitute the only positive principle of the "behaviorists." Observation of all other kinds of objects they suppose to be the mere exploration of "consciousness."

Such objects they dismiss with a wave of the hand, remarking that they are very skeptical as to their existence. Or, if we try to be as lenient with their position as seems to be possible, the very least we can accuse them of is that they suppose that in some way visual objects are more "real" than objects of other kinds, and that for this reason they are more worthy of investigation.

Historically, of course, behaviorism was reinforced by the vague reaction against that type of introspective psychology which took the frank dualistic stand, and distinguished between objects of consciousness and objects of the physical world. This stand naturally leads, in various cases, to the mysterious realm of "pure thoughts," the mystic world of "psychic structures," the logical field of "universals." It was the attempt to describe these "purely psychic" objects which provoked the behaviorist revolt. Only the realization that "psychic objects" are not made of peculiar stuff, but are distinguished from any other kind of objects merely by their irregular occurrence and their symbolic or redintegrative function is needed to settle the introspectionist-behaviorist dispute, and to put the psychological regiment in good fighting order again. For, this realization accomplished, the behaviorists need no longer limit their observations to visual objects, and the introspectionists need no longer fancy that they are describing a realm of pure spirits. All the objects, qualities, relations and patterns, regardless of their modality or category, may thus be conceived as legitimate subject matter for scientific description and report. One of the chief sources of disorder in systematic psychology is the sensuous bias that inclines either toward or away from visual types of event.

THE NATURE OF INFERRED OBJECTS

For introspection, as a mode of inspection and report, does not differ from any other kind of observation, and objects and events that are accessible to but one reporter do not thereby acquire any peculiar existential status. Moreover, "inferred" events or objects may be as legitimately assumed by one science as by another. Nor are fictions or constructs, that is, purely conceptual, nominalistic, and convenient inventions, the special privilege of physics and of politics.

That science may profitably venture beyond the descriptive point of view is not denied. It may, and does, by various logical devices, offer accounts of such presumed existences as are apparently required to bring consistency into the facts of direct experience. Theology does the same thing, as do also the fine and applied arts, such as literature, music, medicine, and diplomacy. The value and extent of such fictional scaffolding has been clearly pointed out by many, of whom Vaihinger was the most laborious. We may allow unlimited play to the inferential activities of creative imagination, without committing ourselves to the metaphysical and epistemological dualism to which it commonly leads.

Back of such natural events as resistance, extension, motion, change, and duration, physics puts the mechanical world of conceptual time, space, and energy. Even chemistry makes much use of inferred processes, figures of speech, and spatial and anthropomorphic analogies. Back of the array of emotional occurrences theology puts its deities, demons, havens, ghosts, and resurrections. By the same technique diplomacy evolves its divine rights, its national responsibilities, its communal aggressions, and ethics its values, duties, and ideals.

Logic formulates its fictional world of universals, absolutes, essences, ideas, implications, and meanings. Psychology also has more than its share of the products of creative imagination—mental elements, minds, memory, instincts, complexes, wills, intelligences, and, more recently, purposes.

But the technique involved in the development of these "inferred objects" cannot be systematically ignored. The magnificent achievements of the science of physics illustrate the practical advantages which such preoccupation with "constructs" may secure. But the changing character of the "inferred objects" of theoretical physics betrays their lack of existential status. Thus the phenomena of heat and light remain unchanged, but the presumed "underlying bases" of these events have had a checkered history.

The systematic danger involved in the elaboration of "inferred objects" (such as phlogiston, ether, demons, electricity, and instincts) arises from the tendency to overlook a very insidious form of error. This error consists in failing to observe a very simple though obvious principle, namely, that it is futile to apply to experience as a whole the concepts that originate *within* that experience; that there is no warrant for applying to the world as a whole such categories as are derived only from the interrelations of events comprising that world.

Thus such terms as cause, time, justice, expense, and right, designate the characteristics of sequences within the field of natural events. When physics seeks to assign causal efficacy to its inferred objects, it easily gives birth to a perplexing array of artificial problems. And when politics seeks to adapt to international relations those practices and concepts that have arisen only within federated groups of individuals, it speedily discovers their inapplicability. For concepts arising out of the relations of fellow citizens can be given only a figurative construction when applied to an array of unfederated nations.

The dilemmas of international diplomacy and the precarious history of theoretical physics arise alike from the uncritical elaboration of inferred objects. Psychology can save itself from awkward predicament only by assuming throughout the descriptive point of view, making chary use of such inferred objects as mental elements, such constructs as purposes, and such fictions as instincts and the physical stimulus. The descriptive point of view confronts only the psychophysical continuum of events.

To insist upon the inferred character of these terms is not to deny their interest, their practical utility, their convenience in prediction and control, nor their aid in the discovery of unfamiliar natural events. It is only to emphasize their instrumental character and to warn against the confusion of these nominalistic fictions with the immediate psychophysical continuum of natural events.

CHAPTER XIII

MEANING AND THE PSYCHOPHYSICAL CONTINUUM

> I could wish that in examining this theory, the same methods were pursued which I endeavored to observe in forming it. The objections, in my opinion, ought to be proposed, either to the several principles as they are distinctly considered, or to the justness of the conclusion which is drawn from them. But it is common to pass over both the premises and conclusion in silence, and to produce, as an objection, some poetical passage which does not seem easily accounted for upon the principles I endeavour to establish.
>
> EDMUND BURKE

Among the various errors of the past, as we have seen, was that of marking off the "purely mental" as a separate and peculiar field or mode of existence, distinguished from the "physical." There are degrees of this distinction, of course, but all alike seem miscalculated. Thus the "stimulus" (which is really but some other aspect of a total event) is conceived as being "purely physical." Sensory qualities are conceived as being on the borderland, or given an equivocal status, as when Russell suggests that they are both mental and physical. Finally, "thoughts," "images," "feelings," and "ideas" are supposed to be "purely mental." Even when the structuralist abandons his creed and describes such phenomena as "recognition," "meaning," and "judgment" as the "behavior" and temporal organization of contents, the contents are the peculiar stuff of "consciousness."

Thus there are supposed to be "conscious events" as well as "natural events," and a "conscious event" is not merely a "natural event" being reported, but an episode *sui generis,* which may, however, reveal, intend, point to, or mean some event in the natural order. "Conscious events," to be sure, are usually supposed to have a physiological correlate, which is also a natural event, but not the one which the conscious event means or reveals.

In this way we are afforded such concepts as the "thought of" a natural event, a "purely mental" disease, and the "influence of mind over body." We get the distinction between objective facts and events, qualities, relations, structures, and episodes, on the one hand, and on the other certain peculiarly subjective, conscious events which mysteriously represent, mirror, or reveal these objective events. There are thus assumed two types of content, the manifest and the latent, that is, mental and material.

THE MENTAL AND THE PHYSICAL

A simpler account would be as follows. All events are, once and for all, natural events. As events, they may or may not be easily identified and reported, but all are equally "natural." What is important (over and above their uniformity) by way of distinction may be found in the two types of sequence which Russell, following Semon, calls modes of causation. In the first place, there is the type of sequence in which the total antecedent is required to instigate the consequent. We mean here by the total event not, to be sure, the total state of the universe, but a certain discriminable context which science is able to demark as the cause. This sort of sequence characterizes what we call the physical world; it is characteristic of inanimate nature, apparently of plants, perhaps also of animals with a certain low degree of structural differentiation.

Hang the thermometer outdoors on a cold winter day, suspended from a nail on the side of a brick wall. The mercury falls to zero. In this complex set of antecedents various items are to be discerned—the nail, the temperature, the brick wall, the date of the event, the identity of the actor. But thereafter only a certain feature of this context is again potent to lower the mercury, which does not fall when merely suspended from a nail, hung on a brick wall, handled by the previous individual, nor upon the anniversary of the previous occasion. Even if you apply a little cold air, the mercury will not fall to zero. To get the original effect you have to repeat the causally significant total antecedent situation. It must be zero weather and the thermometer must be exposed.

When the sun rises, the flowers turn to face the light and warmth. Next day at the same hour they will not so behave just because you approach them, nor because the former hour draws nigh, nor even if a stream of warm air be directed upon them. The total original effective antecedent must be present to produce the sequential response. (Certain observations suggest that even plants may show the redintegrative type of response. If they ever do so, they show the type of phenomenon here characterized as mental.)

Consider now your dog. A ragged stranger, meeting him at the corner, picks up a stone and pelts him so that he runs howling away. Thereafter the dog may howl at any stranger, at any ragged man. He will avoid the corner, and even the sight of his master stooping as if to pick up an object may set him fleeing or whining. So also will the previous responses of a human being be reinstated or duplicated by trivial details of former antecedent situations. Thus natural signs, gestures, facial expressions, words, places, and varied minor resemblances touch off the response, instigate the consequent, appropriate to some more complex context.

Perhaps a simple way to state the difference here illustrated is to say that the "physical" event follows certain particular details of a context, and them only, whereas the animal and human adjustment is to the total antecedent context, any detail of which may thereafter be effective. In dog and man the part may do service for the historic whole. This is the criterion that may be suggested for mental phenomena. But note that the parts, in the examples cited, are all "natural events," not subjective states. They are phenomenologically describable without the terminology of either the physicist or the psychologist. They differ from the events studied by physics, chemistry, geology, only by virtue of the presence of part-whole potency. This, obviously, is a function not of the events as such but of the intermediating organism, the reacting agent.

There is, to be sure, no "impassable gulf" between "mental" and "physical" on the basis of this distinction, any more than there was on the basis of the traditional distinctions founded on variability and inconsistency of report. In that case we found an intermediate region with equivocal status, and we were much concerned in insisting upon the actuality and significance of this continuum.

We must also recognize that the distinctions we have just made between "redintegrative" and "nonredintegrative" sequences are also only the distinctions between the extremes of a continuum. Between the clear-cut cases we have used as illustrations there may be placed various types of sequence having an equivocal status.

For one thing, there are various degrees of redintegrative efficacy, and for this reason we commonly recognize degrees of mentality. The intelligent individual requires but the slightest duplication of detail for the reinstatement of original consequences. The dull individual, on the other hand, requires a greater approximation to completeness on the part of the antecedent, or requires a greater number of contributing details. Thus a trivial similarity in two situations provides the poet with a familiar emotion and a figure of speech; whereas the imbecile is more or less unable to react to "cues" of any kind, and tends, according to the degree of his "defect," to require the complete duplication of the original antecedent; he is incapable, as the educator would say, of transferring what he has learned from one situation to other situations more or less closely resembling it.

Furthermore, in sequences which we commonly recognize as purely physical, there is often a quantitative reduction in the required stimulus or antecedent, which has often been pointed to as the basis of habit and the condition of learning. Thus a piece of wire which is bent with difficulty the first time, becomes in time bent with greater ease. The new machine requires more power to activate it than it will require later on, when its parts are more smoothly fitted and friction is reduced. The first spark sent across a gap between two electric poles may require more electrical energy than the next one, inasmuch as the first event leaves behind it a changed condition which amounts to a lowered resistance.

Many illustrations of this kind could be indicated. In a sense they represent cases of the substitution of parts for wholes, in the antecedent which precedes a given consequent. The substitution is quantitative or intensive; a smaller amount (and hence a "part") of the original antecedent comes to be required. It may, indeed, be contended, not without a show of evidence, that all redintegrative phenomena proceed on this basis, that a "reduction of threshold" for a given consequent is produced. The efficacy of a qualitative detail might in this way be explained simply on the grounds of its energy value, and, so far as the system is concerned within which the sequence occurs, the qualitative differences of details may be more or less irrelevant. At most they may function only by determining *which* consequent will occur, rather than the fact of its occurrence.

But neither the mechanical modifications which suggest habit on a simple level, nor the intensive reductions of stimulus such as we have described are traditionally classified as "psychic" phenomena. It is nevertheless difficult in many cases to present a satisfactory "mechanical" account of their development. The fact is that it is not possible to draw a sharp line between "redintegrative" and "nonredintegrative" sequences, since nature affords these numerous intermediate types of process. All that we can say is that *the more redintegrative* the process is, *the more mental* it is to be considered. In this way, and fully recognizing the actual continuum, the mental may continue to be defined as the redintegrative.

REDINTEGRATION IN THINKING

Consider now the case of thinking. I think of objects and events that are not present—say of a number of people I have known. How can I do this? A simple way would be for part of each person to be at hand—say each man's hat, or perhaps his photograph, presenting his physiognomy. I may use names which have been associated with the men, speaking, writing, or looking at them. Or I may take attitudes in each case, characteristic of the way in which each person has affected me; I may experience what I call feelings, appropriate to each. Or, if I have visual imagery at my command, such imagery may also be employed. All of these are entirely "natural," though perhaps "private," events.

Thus if I desire to determine beforehand the places at table of a number of expected guests, I can do this only by "thinking of" them, as individuals. I may do this in a variety of ways. I may have photographs of them all, and may arrange these about the table. Or I may have their calling cards, bearing their names, and may use these or may write their names on slips of paper or recite them. Or I may be able to use visual images of each, or to take characteristic attitudes for each, or to have specific feelings indicating each, and so on. The point is that the "thought of" a person is always some actual natural event which is substituted for him, vicariously, in its associative effectiveness, or in the direction of my speech or conduct or further thoughts.

A favorite traditional account perversely insists that before a perceptual detail can function as a thought, that is, can have meaning or be understood, it must first arouse an image, which image constitutes the thought. The following account[1] illustrates this persistent error:

> The interpretation of the words as they are printed goes on in the same way that any other association takes place. Our first experiences are usually with concrete objects. The object is seen again and again, the different experiences becoming associated so that each in turn may call up any of the others. The visual experience may stand for the auditory, or the gustatory, or any other experience which we may have had. Then the object receives a name, and the name, in process of time, becomes associated with the object, so that when the name is uttered, *some image of the object is called up.* [Italics mine.]
>
> Later still, we are taught that certain arbitrary visual symbols represent certain sounds, and the sound having been associated with the object in the past, these visual symbols serve now to *call up an image of the object.* [Italics mine.]
>
> Because of this fact, that the word is associated with the various other ways of experiencing the object, *it calls up the object* and *is consequently understood.* [Italics mine.]

The point on which we here insist is that the detail, be it printed word, spoken sound, gesture, or other object, does not become understood, that is, acquire meaning, through its arousal of an image. No image whatever need be involved in a case of meaning. The requirement is instead that the present detail acquire the same associative effectiveness that the original object would have, that is, that the detail be substituted for the object. The word has meaning not because it arouses an image of the object but because it functions in place of the object in the instigation of consequents. It is this substitutional rôle that constitutes the redintegrative mechanism or process.

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[1] From Adams, *Advertising and Its Mental Laws,* p. 215.

Thoughts are not copies of situations, but fragments of them.

Now all these details, not excluding the tentatively suggested images, are natural events, just as natural as would be the presence of the men. Moreover, each is a partial detail of that total situation which constitutes the presence of the man. There is nothing peculiarly "psychic" about these events, unless we mean by psychic their part-whole efficacy, their redintegrative function.

These details are what we call symbols or signs, referring to their part-whole efficacy. In their signature value consists their mentality, not in any peculiar quality of their being. Photo, name, gesture, attitude, feeling, image, are alike natural events. The images are as actual and as natural as the photographs, and are quite as objective as are the attitudes and feelings. The privacy of the images and feelings no more renders them subjective than does the fact that only one mother can bear her own child make that child a subjective state. Even the feelings are scarcely more private and personal than is a registered bond or a toothache.

Encountering any of these "symbols," if I behave, or if anything else behaves, in terms of the wholes of which they are or once were parts, we have an example of a mental phenomenon. The events are not mere occurrences. They have "acquired meaning," they are now "thoughts" as well as events. Meaning is the determination of subsequent events in the light of the history of the antecedent detail. Thoughts are events of any sort whatsoever that function for larger antecedent contexts; they are not mysterious phenomena belonging to a supernatural realm.

At this point we may suggest that what we have described is not "just a case of conditioned reflex," as that phenomenon is correctly to be described. The implication of "conditioned," for one thing, is at fault. The *ABC* total leads to the consequent, in the very first place, and all three details may be important in determining the consequent. There is hence no conditioning, in the sense of transferring to *A* the response or consequent formerly belonging only to *BC*.

Nor are the consequences here in mind at all mere reflexes in any meaningful sense of that term. On the contrary, all cases of the conditioned reflex are only special instances, and usually minor illustrations of the general redintegrative principle, called by Semon the law of ekphory.

REDINTEGRATION IN MEMORY

Consider now the case of memory. Here is the abode of mystery. How, it is usually asked, can we preserve events that have passed and reinstate them "in the mind"? Memory, not of the habit type but of the reminiscent sort, is the final challenge of the mystics. But how intelligible would psychology become if we would only recognize that the past is never revived. Instead, a memory is always a present event, with the potency of a historic context. Its efficacy applies to its arousal of names and descriptive language, to its associative effectiveness in instigating further events, to its function in leading to attitudes, feelings, and useful actions. The past is not remembered. Instead, some actual present detail, usually perhaps some intimate organismic event, some act, is present, which is sufficiently similar to a detail of the past event as to be indiscernible in its associative effectiveness. And, as in the case of thought, the detail may be of varied character. Even when it is an image, however, as perhaps it may be, it is quite as natural and present an event as is a present sound, a visible rainbow, or a spoken word.

The notion that memories copy or duplicate the original is misleading. In exceptional cases, as when images have part-whole efficacy, such resemblance may be noted. But the true fidelity of memory is not of this copy sort; it lies instead in the redintegrative determining tendency exercised by the present detail. It thus arouses the correct descriptive terms, leads to valid judgments, facilitates proper report of such items as were previously actually noted.

TRADITIONAL CONCEPTIONS

If we can once see the simplicity of this account and rid ourselves of traditional misconceptions, we can readily verify the observations on which the account is based. Such an account does not commit us to the astigmatism of the motor behaviorists nor to the psychic essences of the spook hunters. We are led by it simply into the world of concrete phenomena, the series of natural events. Images, because of their privacy, are not segregated from movements, with their banal approachability. Between these extremes, in the psychophysical continuum of natural events, stand the incipient vocalizations, the feelings, the attitudes.

The strange lengths to which the doctrine of "privacy" has led psychology and philosophy call for psychoanalytic explanation. This myth can be accounted for only through the close historic association of these subjects with theology, where the worship of virginity is perhaps more readily understood. That a private event, such as an image, should have led to the severance of the world of natural events into the two fields of psychic and physical, surely suggests a theological motive. In another connection it has been shown how full this gulf really is of intermediate material and the attempt was made to displace the concept of a severed world by the term "psychophysical continuum." This continuum comprises what has here been called the series of natural events.

But whereas, in the earlier section, the criterion (of convenience) for the psychic extreme was chiefly statistical variability, there is here suggested another feature—the part-whole or redintegrative efficacy. This entails no distinction between one event and another, but relates rather to the correlations among events, and to the varying degrees of completeness in the antecedent required for the instigation of the consequent. Here also no sharp distinction can be drawn, since, among other reasons, all degrees of part-whole efficacy presumably occur.

THE PSYCHOLOGY OF MEANING

This account implies a definite use of the term "meaning," and it remains now to show how the concept of meaning here used relates to and coördinates the various theories of meaning encountered by any one who attempts to explore this topic and its literature. Before attempting the coördination, it may be well briefly to summarize some of these historic versions of meaning. This will make the brief attempt at coördination at least more lucid.

Among the numerous formulations of the nature of meaning, the following may be cited as at least definite and conspicuous.

1. *Intentionalism.*—An event has about it a transcendent reference to something beyond itself. Here we may group, at the risk of argument, the intentionalism of the scholastics; its psychological version at the hands of Brentano and his followers; the "transcendent reference" and "universals" of a notorious school of psychologizing logicians; the "relational theory of consciousness"; the "pointing" function of the New Realists; and the dogma of James that thought always deals with or reveals something beyond itself. We may also include here the vague and half-hearted assertion of certain structuralists that meaning is "purely logical."

2. *Motor Theories.*—In such accounts meaning is described as *consisting of* the adjustments or reactions to which an item or event leads. Here would be included the attitude psychology, the motor psychology of twenty years ago, and most behavioristic accounts of to-day. Bolton, Langfeld, Gore, among others, have suggested such accounts, and Titchener and Washburn approach it in their surmise that originally meaning was a motor attitude, or at least kinæsthesis. For these theories the meaning of an event is a response to it.

3. *The Context Theory.*—For this theory, as it is commonly stated, meaning is marginal content, fringe, introspectively discernible context. Here would belong James' doctrine of the "psychic fringe" or "overtone," and, in a little different sense, Titchener's account of meaning up to the point at which he departs from his initial text that "psychologically regarded, meaning is always context." Whereas intentionalism seems to move chiefly in a field of logic, and the motor theories in the field of physics or physiology, the "context" theory presumably abides by a

peculiar world of conscious stuff, however grudgingly this may be admitted.

4. *Pure Thought Theories.*—Here we may place all accounts in which meanings are looked upon as independent structures, categories, or contents of the stream of thought, not to be analyzed into the conventional elements of sensation and image. Woodworth's "features," Moore's "categories," Buehler's "thoughts," Calkins' "relations," and various descriptions of "structures" and of "funded contents," and presumably the so-called "intellectual sentiments," may serve as examples of these thoughts. Here also may belong the "transitive states" and "feelings of tendency" of James and the "imageless thoughts" of Stout, as well as the "construct" and "type" of Pillsbury and the "cognitive dispositions" of McDougall. Again this rough grouping is hazarded at the risk of argument, but it should suffice to indicate the general point of view: meanings are "mental" events, to be distinguished from the ordinary occurrences of phenomenology.

5. *Mere Association.*—Here belong various accounts, typified by that of Miller who contends that "that which is suggested" is meaning. Meaning, as mere association, would thus be illustrated when *A* suggests *B* in repeating the alphabet, one nonsense syllable in a series suggests the next, a flash of light results in a pupillary contraction, a sound suggests a visual image.

That there are other theories of meaning goes without saying. But we may take these as typical, and inquire in what way the account we have suggested may coördinate them. Briefly, our account is based on the redintegrative mechanism. A complex antecedent, *ABCD,* instigates a consequent, *XYZ,* (we avoid the term "response" to escape the flavor of contemporary motor behaviorism). Thereafter, if it occurs that the consequent *XYZ,* or one belonging in the same class, is instigated by detail *A,* or a detail belonging in the same class, by virtue of the historic participation of *A* in the situation *ABCD,* we have a case of meaning. The fact of meaning is the determination of *XYZ* by the previous context of *A*. Meaning is thus a function, a dynamic relation; it consists in the part-whole efficacy of *A*. Meaning is the fact of redintegrative sequence.

Consider now the elements of truth in the traditional accounts. Intentionalism, for example, followed a genuine clue. It is in a sense true that *A* is self-transcendent, reveals more than itself, points to something more—and the sense is a figurative one. The fact underlying the figure is the part-whole efficacy of *A*. But meaning could never be discovered by the mere examination of *A*. It is only in the longitudinal section of events, in their march and process, that meaning is revealed. And the meaning of *A* is not the other details of its previous context, but instead the fact that it functions for them.

The motor theories were also on a suggestive trail. The element of truth perceived by them is that meaning always involves a series of events, a consequent instigated by an antecedent. But in overlooking the genetic or historical features of the situation and using the term "meaning" merely to designate the consequent, and in the limitation of the term to motor consequences, they were sidetracked from the actual destination of the trail.

The context theories also have their virtue. Meaning does involve context, but not necessarily momentary nor introspectively discernible context, nor context made of conscious stuff. It is historical context that is involved in meaning, since it is by virtue of the place of the present detail in a previous context that the instigating detail acquires its part-whole or redintegrative tendency.

Even the mere associational theories hit upon an important element of the truth. Associative effectiveness is present in all cases of meaning, but there are various other forms of associative effectiveness. Only when the particular direction of associative effectiveness is determined through the previous participation of the instigating detail in a previous whole, do we have a case of meaning. And then the meaning is not "what is suggested," any more than it is "the previous context." Meaning is the fact of redintegrative effectiveness, in the special sense in which the term is here used.

In any case of meaning, four features are to be discerned, which we may designate briefly as (*a*) the *significant,* (*b*) the *signified,* (*c*) the *signifying,* and (*d*) the *significance.* Each of the classical theories has hit upon one of these features and overemphasized it into an account of the whole meaningful situation.

What of the "pure thoughts" as instances of meanings, of the account of meanings as unanalyzable psychic contents, categories, structures, cognitive dispositions? The redintegrative account must reject them in the form in which they are usually presented. In the observation of the present writer, the "pure thoughts" represent faulty report of natural events and processes which have meaning in the sense herein indicated. These very reports illustrate the redintegrative efficacy of fairly simple natural events, especially in their relation to linguistic consequents such as are found in the verbal protocols.

In the chapter on Symbolic Relations we have already undertaken a more detailed account of this situation.

In general, then, we look upon the phenomenon of meaning as the essential differentiating feature of the psychic or mental. But meaning is only an aspect of the correlation of natural events, and the introduction of this criterion does no violence to the integrity of the psychophysical continuum.

The continuum of nature is a procession of events encountered in a temporal series. The "references" found in nature are references of present item to past context, that is, substitutions of partial present items for past total contexts. Meaning is therefore a temporal phenomenon, and meanings can be understood and explained only by an expedition into the past, or by indirect records of the historic course of temporal events.

It should not be necessary in detail to point out how radically this account differs from various other theories of the nature of meaning. These fall roughly into two large groups. In the one group meaning is supposed to be the process whereby psychic, purely mental, subjective items represent, point to, refer, or intend actual objects and occurrences conceived as "existing" in a *spatial* order. "Thoughts" are supposed to be mere transient phenomena, in a nonspatial field. But the "things" they mean are supposed to abide fixed and more or less immutable in the "public space" of theoretical physics. Meaning, as this reference to spatial objects, is thus a spatially involved phenomenon.

In the other group meanings are supposed to be in themselves a peculiar variety of psychic occurrence, along with sensation, image, and affection, which in some way unite the subjective and nonspatial flow of psychic phenomena to the spatial world of objects; or else, in a somewhat different form, these spatially located objects are themselves said to be the meanings of the nonspatial psychic episodes.

Our own account differs from all these in taking as fundamental the temporal flow of events. Sequence is primary. Permanent objects, public space, subjective episodes, and transcendent reference are only convenient ways of portraying or conceptually recording the immediate flow of nature, which is neither psychic nor physical, but simply natural. Meaning is temporal rather than spatial reference.

CHAPTER XIV

PARTICULAR FEATURES OF MEANING

> This matter might be pursued much further; but it is not the extent of the subject which must prescribe our bounds, for what subject does not branch out to infinity? It is the nature of our particular scheme, and the single point of view in which we consider it, which ought to put a stop to our researches.
>
> EDMUND BURKE

Meaning we have defined as a functional activity or sequence, involving the instigation of a consequent by a detail of its former antecedent. The following experience will serve the purpose of concrete illustration. I had entered the lecture hall with my friend, who opened the door while I preceded him. After I had taken a few steps slowly, a figure came up alongside me and I at once began to speak, continuing the thread of our previous conversation. Then I abruptly stopped speaking as the strange young woman who was just passing me went on ahead and up the stairs. I had "thought" that the figure alongside me was my friend, and had at once continued the conversation that had been interrupted by our entrance through the big door. The perception that it was not my friend, but a stranger who looked at me quizzically as I spoke, stopped my flow of speech at once.

In ordinary terminology, the appearance of a shape alongside me *meant* that my friend was again within conversational distance—the shape *meant* my friend. What, as a matter of fact, did exactly occur? Nothing except that the appearance of the figure started my conversation going again. That was what it was for the shape to have the particular meaning that it did. It *led to* or *instigated* another event, which was the same event (an event in the same class) that would have occurred had my friend been entirely there. There was no discernible peculiar conscious content to be designated as the *meaning* of the shape; the meaning was its function in releasing my speech mechanism rather than in making me dodge. And at the point where its *meaning changed* all that happened was that now sufficient details appeared to set off a different adjustment on my part—to instigate a different consequent.

NATIVE AND LEARNED SEQUENCES

In a psychological account of meaning we must distinguish between acquired and original sequences, between learned and native reactions. Meaning may be considered as entirely concerned with the former, with the learned, the acquired, the conditioned. A reaction or sequence of the reflex or the purely instinctive type shows no explicit sign of meaning, in the sense in which the term is here used. *Native* reactions are not to the *meanings* (the signified) of events, but to the events themselves. They are therefore physical, not mental sequences. Thus the blinking of the eye in response to a sound is not a reaction to the meaning of the sound but to the sound itself as complete and immediate event, as sensation or as mere perceptual complex.

In many instances, indeed, native reactions are themselves essential parts of the sensory or perceptual event.

Thus the attitude toward a color is an essential part of the event "seeing a color." Although reactions or sequences of the native sort are not *meaningful,* it does not of course follow that they are not *appropriate* or *useful.* They are appropriate, and this presumably is at least part of the reason why they are perpetuated in natural selection. But their origin is philogenetic, not ontogenetic. Some observers, Hall or Jung, for example, will be inclined to say that it is to a *racial meaning* that the native reaction is made, that the experience of the race has given the event a real meaning. But for the present it is better to restrict meaning to the function which events acquire through the experience of the individual, either directly or indirectly.

In the suggestion of racial meanings we approach the doctrines of Hering, Ribot, Semon, and others, that there is a close relation between *heredity* and *memory.* Heredity does for native reactions what individual past experience accomplishes for learned sequences. But the *mechanism* involved in the two cases is presumably different, although Semon believes that both heredity and memory work under the laws of mnemic causation, through the engram and its ekphory.

Individually experienced events acquire meaning through the operation of "traces" or engrams of the past, along with the present event. The burnt child dreads the fire because he has survived it, and through the redintegrative mnemic process the single detail now produces the final previous reaction or consequent. Much difficulty has been encountered in the account of this process, as by Meynert, James, Russell, Watson, and Kantor. The difficulty arises from their taking the fire as the stimulus, the reaching reaction as one response, and the withdrawing reaction as another. The problem then becomes, how is it that making neither reaction, just looking, becomes substituted for the two reactions, reaching and withdrawing? On this basis there is bound to be difficulty.

On the other hand, the fact is that the first or original event was reaching for the seen candle and experiencing pain. This total event was followed by withdrawal. Now the mere sight of the fire produces an avoiding reaction, or at least a tendency which negates such an event as the reaching reaction.

In such a process there is really a *formative* mechanism involved. Something happens in the reaction systems of the individual, which remain changed as a result of this experience. But, unless we definitely assume the inheritance of acquired characteristics, native reactions disclose no such formative mechanism. They do not follow the laws of mnemic causation. Instead their production is through variation and selection. Thus the resemblance between heredity and memory is not in virtue of their *mechanisms* but follows merely from the nature of the practical *results* which both achieve.

Both result in appropriate reactions, but appropriateness in this sense is not a psychological but a biological category. Just what appropriateness, in a psychological sense, is, must be asked on a later occasion, when such concepts or phenomena as harmony, fitness, congruity, contradiction, and the like, are examined in detail. But it is at least clear that a distinction must be made between "a feeling of fitness" and "biological utility."

Whatever meaning may be attributed to events in their instigation of native reactions, it is a type of meaning that is confused with *value* or *importance* in the objective sense. To say that the event has a meaning in the life of the animal, in this sense, is only to say that it is important that an adaptive response be made and is made. The event has relevance, but relevance must be distinguished from meaning in the psychological sense.

If, then, we are agreed that response to the meaning of events involves always acquired or learned sequences, we must at once point out that not all sequences dependent on learning are responses to meaning. Thus a native *tendency* may through repetition be rendered more fixed, definite, certain, and prompt. But meaning is not involved in such learning. Again, in rote memory, learning results in the establishment of new bonds. Contiguous items of the memorized materials or reactions are linked together, so that one leads to the other, as in reciting the alphabet or a series of nonsense syllables. That *A* should lead to *B,* that it should have associative connections, is the result of learning. But it does not follow that meaning of any kind is involved in mere associative sequence.

In order for learning to display the characteristics of meaning, a particular pattern of associative action seems to be required. This is that type of learning in which a partial detail, as *C,* of a complex event, *ABCDE,* touches off a complete response, *XYZ,* which formerly (either as native or acquired) was touched off only by the complete event *ABCDE.*

REDINTEGRATION AND CONDITIONED REFLEX

In another connection it has already been pointed out that "conditioned reactions" are not identical with the redintegrative sequences here considered, but are instead only a special case of them. The following distinctions are to be made. The conditioned reaction principle assumes that some first reaction is made to an original stimulus or event. This is the unconditioned response. To this response is then supplied another stimulus, by associating this latter with the primary stimulus.

But in the redintegrative sequence no distinction of fundamental reaction and primary and secondary stimulus need be made. The response may be instigated originally by all the details of a stimulating (antecedent) situation, by a synergy of various stimuli, for the very first time. Thereafter the occurrence of one of the details provokes the total reaction. Clearly this is very different from the bare scheme of the conditioned reaction, which is only one case of the more general principle. Redintegrative sequences need not involve reflexes, in any acceptable sense of the term, nor is their production dependent upon frequent repetition. They do not require secondary stimuli which forego their native responses.

Semon's account of the action of engrams is especially interesting in connection with the redintegrative account, even though the latter requires no neurological counterpart, which would at best be but a correlated event. But the general features of Semon's account are so nearly identical with the redintegrative mechanism that it may be well to state his three fundamental laws. These are as follows:

1. The engram left by a complex stimulating set of details is a single engram, and tends to be aroused in total form thereafter.

2. For reinstatement of the engram the total stimulating situation need not be present thereafter, but any part, or at

least certain parts, of the original stimulating situation will suffice to arouse the total engram,—to "ekphore" it.

3. One part of an engram may ekphore another engram in the same way that part of the stimulating situation reinstates the total engram.

Semon develops this only as an account of memory. But it serves adequately also as an account of thought. However, just as in the case of the neuroses something in the way of motivation or direction must be added to the redintegrative mechanism, so also in thought (as reasoning) something in the form of "problem," *Aufgabe,* "set," or "determining tendency" must be worked out in its detailed application and influence. Inasmuch as details belong to various engrams, we must explain why on a given occasion the particular one, rather than others, functions. In a later connection, in the account of reasoning as a form of thinking, it will be shown that motivation is only a more general or inclusive form of redintegration, in which two or more clues function instead of one.

IS "TELESCOPING" ALSO MEANING?

A characteristic human and animal reaction pattern is that which Jennings has so clearly described in the case of some of the microscopic forms. It has sometimes been called the "telescoping" of reactions. Thus, if a stimulus of moderate intensity be applied to Stentor, it waves its oral end away. Upon repetition of the stimulus one or more times there ensues instead a contraction of the stalk. With continued application of the stimulus, neither of these reactions occurs, but instead the organism unfastens itself and moves bodily away. On a subsequent occasion the first application of the stimulus is followed at once by the final step of this reaction series—Stentor moves immediately away.

In one sense this is only a case of varied reactions to the same kind of stimulation, the variation depending essentially upon previous stimulation and its after effects. But it has also been described by some writers as the telescoping of a series of reactions by the dropping out of the intermediate steps. In this way the constant or repeated stimulus *S* leads originally to reactions *A-B-C-D,* but finally it leads only and directly to *D.* Some observers might at once conclude that the stimulus has now acquired a *meaning.* Or a devotee of the motor theory of perception might suggest that the stimulus has now acquired a *new* meaning.

It seems clear, however, that meaning can be attributed to this process only if the state of the organism be included as a stimulus. If this is done we may say that the reactions to the later appearances of the peripheral stimulus are not determined by *S* alone but by *S* plus an additional experience or context, namely, an intraorganic condition. But it is not clear that the state of the organism is properly to be called a stimulus. Is it not instead more properly only an essential part of the reagent? If not, then the whole distinction between reagent and stimulus must give way. If the organic state is part of the reagent, it can scarcely be called a meaning. Perhaps, on such grounds, the most that we can say is that the telescoped series is the vague basis on which what we call meaning may develop in higher forms of organisms.

There is, however, the possibility that this type of response more closely resembles the ordinary chain reactions, in which the first response becomes a stimulus to the second, and so on. The intermediate reactions or events may, of course, be much abbreviated, may become tentative or incipient only, or the overt reactions may be definitely inhibited by the beginning of the later acts, which interfere. The earlier steps will thus be supplanted in observation by the ensuing steps which more overtly occur. Whether or not such an account will adequately describe what we have called a meaningful sequence or act, is a pertinent question, to be answered presumably only on the basis of direct observation. It is even possible that what has been here called the redintegrative mechanism could be given such an explanation.

Such an explanation has sometimes been offered, as by Roussy and Lhermite, in the case of neurotic conduct. These authors assume that between the stimulus and the reaction there occurs what they call "a remembered emotional state" of which the symptom is the expression. Dejerine and Gauckler also assume "the revival of the image," which image it is that instigates the symptomatic response. But the redintegrative account seeks to get along entirely without these interpolated but telescoped processes, and this is indeed its special virtue.

We can rely, for our judgment, on two criteria. In the first place we may appeal to observation, to what is called introspection. If such observation does not reveal the intermediaries, we may then either insist that they must nevertheless have been present, in such fleeting form as to escape report, or else we may say that since the evidence for such intermediaries is missing, we are at liberty to work on that assumption which, while adequate, is least complicated and makes the fewest supposals and conjectures.

Of these two assumptions, the simplest is surely not that of the unnoticed presence of intermediate events—the assumption, for example, of Binet's invisible image—but instead that of the simple sequence of the mnemic sort described by Semon (omitting, as purely theoretical, his notion of the engram). If the reactions to details may be the same as those that would be present if the total were operative (if engrams function as total patterns and are aroused by details of the stimulating situation) this is enough to explain the significance of signs as well as the reinstatement of the neurotic symptom.

Woodworth[1] suggests an explanation of the "telescoping" process which lines it up with the redintegrative mechanism, called by him "the law of combination." The explanation is as follows:

> When however this indirect linkage between stimulus and motor response is frequently exercised, short-circuiting takes place and the stimulus word arouses the motor response directly. Short-circuiting follows the law of combination very nicely. Let a stimulus *S* arouse an idea *I* and this in turn a motor act *M*. *S–I–M* represents the linkages used. But undoubtedly there is a weak pre-existing linkage directly across from *S* to *M*, and this gets used to a slight degree, strictly according to the conditioned reflex diagram, with *I* playing the part of the effective stimulus in arousing *M*, and *S* the part of the originally ineffective stimulus. By dint of being exercised in this way the linkage *S–M* becomes strong enough to arouse the motor response directly, and *I* is then very likely to be left out altogether.

If this account be accepted, the telescoping or short-circuiting process falls sufficiently in line with the redintegrative mechanism to be considered an instance of the acquisition of meaning, since the first reaction, the state of the organism, would be included as part of the antecedent, instigating, or stimulating situation.

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[1] *Psychology,* footnote p. 405.

LEVELS OF MEANING

That there are levels of meaning is suggested by a classification of neurotic symptoms, which classification has certain advantages and a definite theoretical suggestiveness. Such symptoms may be classified as belonging on the postural, the autonomic, and the cortical levels. In some ways this distinction resembles the ancient threefold division of mind into intellect, feeling, and will, and it must be said that the old distinction has many advantages.

Thus, in the case of the neuroses, postural symptoms yield paralysis, contractures, motor automatisms. Autonomic symptoms give anxiety states, depressions, chronic fears. Cortical symptoms yield fixed ideas, obsessions, thought fixations, and the like. In the same way we may point out three levels of meaning, and corresponding to these, three different ways of understanding an event.

1. On the postural level meaning is concerned merely with our conduct, our overt behavior and actions. Meaning shows itself through appropriate muscular action or adjustment. I understand or know the meaning of a carburetor, a lock, a stove, when and in so far as I can handle it. I understand a mechanical puzzle, that is, know its meaning, when I can take it apart or put it together. In just this way the horse knows the meaning of a whip or of a call, the dog knows the meaning of a whistle or of a stooping gesture, when he reacts in the

appropriate or standard or useful way. The redintegrative basis of such understanding is evident and is clearly revealed by the history of the learning process.

2. On the autonomic or affective level I know meaning when I get the appropriate feelings, attitudes, and emotions. Here meaning is very close to *value* and this is the excuse for the occasional attempts to identify meaning and feeling. On this level it is possible for me to know the meaning of music, of a dance, a statue, a poem, and of various figures of speech. Again, as in most æsthetic reactions, the redintegrative basis is apparent.

3. Intellectual or cognitive meaning is the presence of an appropriate context of concepts, images, references, relations, notions, ideas, associative tendencies, and, in many cases, of appropriate naming responses and of varied secondary meanings. Thus we know the meaning of a scientific law, of a mathematical proposition, of a telegram or code, and of many signs and symbols. The redintegration is of symbolic processes rather than of autonomic or postural acts.

Naturally these distinctions are not sharply isolated in experience. In actual cases, as in getting the meaning of a telegram, meaning on all three levels may be present; or on more than one level, and unequally on the various levels. But the distinction is a useful one, and develops neatly the general theory of meaning in its redintegrative aspect. Meaning may be unconscious or automatic on the postural level, emotional on the autonomic, cognitive on the cortical. Music, as an example, may be either produced, enjoyed, or understood.

Obstruction or failure of meaning on one level throws its process up to a higher level. If the cook tries to shake the stove and it does not work, meaning shifts to a higher level, the emotional one. She becomes enraged and by virtue of her rage she shakes harder and in random and unstereotyped ways, and may thus succeed in moving the grate. But if this shift does not work, a further shift to the level of thought comes about, and she examines the mechanism, recalls previous experiences, sends for assistance.

On the other hand, meanings which function adequately tend to degenerate to lower levels as they become perfected. This possibility of shifting to lower levels, the tendency to automatization, has many advantages. This is essentially what Titchener has in mind when he speaks of the law of reduction in imagery. The falling away of imaged context and the carrying of meaning by kinæsthesis becomes on this account intelligible. It is the shift of meaning from the intellectual through the affective to the mechanical level. But the purely introspective account fails to do justice to the dynamic and functional processes, which are revealed only when due consideration is given to the temporal aspects, the sequential feature of experience.

MEANING AND LOGICAL IMPLICATION

The redintegrative account of meaning applies even to natural signs or natural laws. Three equal angles *mean* three equal sides, in a triangle. This, we may suppose, is a case of "logical implication," or "geometrical necessity," or "matter of fact," or "association of ideas," as one may prefer. But no matter what vocabulary is employed, the simple fact is that "three equal sides" is *part of a total* which includes "three equal angles." It is the relation of part to whole that underlies not only the mental process but as well the logical or physical fact. Hence the *meaning* or significance due to causal connection, or involved in logical implication is not unrelated to meaning in the simpler psychological sense. The psychological observation is directly relevant to the logical problem, and is indeed essential in its solution.

It is not necessary to go through any "universal," or through any additional premise. At best such additional premise or universal would only indicate the whole or total, which is not something more than the parts and their relations but just these parts in relation. Judgments are then merely statements of the meaning of signs. Thus: "The humanity of Socrates is a sign of his mortality" is all that is involved in the classical syllogism. Meaning leads directly to judgment, and at least to that extent logic is dissolved in psychology. Cannot all syllogistic reasoning be thus considered as a matter of reading and reporting the meaning of signs?

In this way fire means smoke, sand in the sugar means broken teeth, a north wind means cold weather. Hume's definition of a sign as "nothing but a correlative effect from the same cause" should be modified to read, "A sign is nothing but part of the same whole." This eliminates the more or less mystical notion of *cause,* which was a difficult problem even for Hume.

When one end of a tiltboard is elevated, the other is depressed. The elevation becomes a sign of the depression. The remaining premise is simply the affirmation of the nature of the total situation: "When one end of a tiltboard is elevated the other is depressed." This assertion merely states the nature of a rigid body and it is far from essential to the deduction of meaning, which, indeed, must of necessity precede it and make it possible.

This is why the second premise is so often suppressed, and also why it seems so strange and affected when it is proposed to students of formal logic. It is actually not a part of thinking, for thinking is passing from parts to consequents, in the light of antecedent wholes. The syllogism in this case rests merely on the nature of a rigid body, and inference from one detail is only taking the one as the sign of the other, or of the whole.

This similarity of the meaning function in thought and action, on the one hand, and in implications of natural science and mathematics, on the other, suggests that the distinction between thoughts and things, which is usually so sharply drawn, is less definite and rigid than is usually supposed. At least from the psychological point of view, we deal from the very beginning with *events,* or with what has often been called *experience,* which word has been much maligned because of the mystical temptations it offers.

But the seeing of an object is not, psychologically, what we subsequently analyze it to be in logical terms. It is a total event. After it has happened, and after considerable further experience has been brought to bear upon it, we distinguish within it the thing seen, the seeing, the seer, the reaction or attitude, and the memory trace. But in the event itself all these were one fact.

We classify events into the physical and the psychic, the real and the unreal, the objective and the subjective, on the basis of what we later learn about them, not on the basis of their immediate characteristics. In the very appropriate words of Herbart, "The difference between soul and matter is not a difference in the nature of simple essences, but it is a difference in the manner of our apprehending them."[2] The distinctions are convenient, and perhaps this has some implication for epistemology and metaphysics, as it does also for commerce and industry. But in the interests of practical life and under the dichotomizing tendencies of verbal language and legal precedent we ignore the great region which lies between our two distinctions—that great field of intermediate events which completes the psychophysical continuum.

In a very real sense the notions of "neutral stuff" and of "essence" which the New and the Critical Realists have developed have an importance for psychology. The events with which psychology starts, as is the case also with all other sciences, are *neutral,* in the sense that they occur before the analysis of subject-object, attribute-substance, term-relation, action-agent, and the like, has been made. These analyses themselves are only other events.

It is *events* which have meaning, or through which the function of meaning is realized. The image is an event, the attitude, the feeling, the word, the gesture, just as truly as are the table, the rainbow, and the explosion. The organism does not become conscious of objects through the intermediation of states of mind. Mind, organism, and object are all there in the perception. It is just as true to say that the color becomes conscious as it is to say that the spectator does so. What is true is that the *situation* becomes conscious; it is a conscious situation. We have defined a conscious situation as one in which an antecedent instigates a report of itself.

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[2] *Text Book of Psychology,* translated by Smith, p. 121.

PERCEPTION AND THOUGHT

Meaning is never complete except in original perception, that is, in the first known occurrence of an event sequence. Smoke means fire when it is actually attended by it, and here the meaning is *complete* or actual. Such a condition, that is, the field of natural signs, is the origin of all meaning. But in thought the meaning is *incomplete.* It may nevertheless be *effective,* in the sense that it leads to further developments and stages, which in turn may also be incomplete and sketchy, yet effective also. But a *final* meaning must be full and complete and *realized* in perception. This is perhaps what Dewey means by the moving to and from the meaning; the meaning is suggested by a particular or detail, and from the meaning we return again to perception for verification, for completeness. Autistic thinking is not thinking freed from reality. It is thinking that strays far beyond perception and does not dip back into it again. That is, its meanings are not finally realized in perceptual completeness, or, in Dewey's terms, are not verified.

The complete signification of a perceptual detail (datum) is then the total perception of which it is originally a part, and this would also include the postural and autonomic events. But the rule is that in thought meanings are usually partial, and this is why their introspective description has seemed so difficult and unsatisfactory. The *effective details* or elements also vary from time to time (and from person to person, if we care to go beyond individual report), and this is what accounts for the irregular verdicts, the imageless reports, the feelingless accounts, the reports of meaning without sensation or image, even of the kinæsthetic and organic varieties. Meanings *exist* only in nature, but they *function* in thought, and to function they need not be complete.

If in thought a meaning is complete, we call it either a perception or an hallucination. Which it is cannot be determined by the analysis of its constitution or components, but only by its place in the accepted scientific order or in the socially accepted practical world of history. It must be checked up by various devices which we agree to employ to indicate the physical, or by the social devices which we agree to employ to indicate the real or objective.

The *migraine figure,* a familiar optical event, is an excellent example. It is, as an event, complete and vivid. It has attributes of order, duration, pattern, extent, location, quality, liveliness, and obstinacy. Yet it can no more be subjected to the test of *other senses* than can the rainbow. It is even more real that most visual objects, real, that is, in the sense of persistent and unavoidable. One sees it with eyes either closed or open. As a phenomenon it has no present meaning except its name, for there is no special context in which it occurs. But one part of it definitely means the rest of it. The meaning is *complete* when the remainder actually follows. Its meaning is incomplete, but effective, in so far as one postpones his work or prepares to rest or exercise, or feels depressed at the prospect. The identification and naming are what we have called cortical meaning. The preparations are postural, and the depression is autonomic.

COMPLETENESS AND INCOMPLETENESS

What we call traces, or images, or thoughts, of objects and events are distinguishable from the originals which they *mean* only by their incompleteness. Thoughts are fragments or details of previous totals. Hence there is no special mystery in the relation of present to absent object, any more, at least, than there is in the relation between one perception of an object and another perception of it. In a sense it is not the same object, even when continuously regarded, just as, in a sense, a tree is not exactly the same tree on two different occasions. But just as truly as the tree remains the same tree, or two perceptions of the same object are the same perception, just so truly is the thought of an object only a *part* of that same object.

The *thought of* an absent event is a part of the event, in just the same sense that the tail of a rabbit that has plunged into a hole is a part of the original rabbit, of the rabbit formerly seen; or in the same sense that the glimpse of an object seen through a lace curtain or a smoked glass reveals part of the object seen in greater completeness when the screen is removed. We pursue the rabbit whose tail alone is seen, just as vigorously as we did when his whole body was in view. The seen tail has now become a symbol, inasmuch as, being part, it functions for a previous whole. We fear the burglar behind the curtain no less than when he is in full view. We fear the fancied or remembered burglar also, in just the degree to which he is completely present.

If now it be asked what *makes the difference* between the complete burglar (of perception) and the incomplete burglar of thought, the reply is that the question leads us beyond psychology. We must look to physiology, or to physics, or to the efficient police force for such explanations. The world of thought does not differ from the world of perception except in completeness, so far as description is concerned. It is only in so far as collateral explanations may be found for the differences in completeness that the two are to be practically distinguished. The difference is not of kind but of degree.

It must, however, be noted that the detail present in thought may not be a very conspicuous detail of the immediate perception of the historic event. It may instead be a trivial and accidental detail, even what we call an "associated" detail, such as a word, gesture, an attitude, a specific feeling, an imaged article of clothing. But any and all of these were part of the original event or situation. Whatever be the detail, in so far as it functions in place of the total of which it was originally a part, it is a thought. In so far as it does function, it functions redintegratively, leading to action, feeling, further thought, or to new events of perception. Depending on the sagacity with which it is chosen, it functions correctly or uselessly. But even when it functions uselessly or detrimentally, as in hysteria and in dreams, its status as thought remains unchanged, and the redintegrative mechanism underlies its instigatory efficacy.

Thus the distinction between thought and perception is gradual, not sharp, even as language usage suggests. A *false* perception is often described as a *thought.* If the object in the distance is mistaken, we may say, indeed, that even this was perception, but the victim of the error is likely to reply that he only *thought* it was a house, whereas he now *perceives* it to be a haystack. What marks the line or moment between these two? Not the process itself, but what is later learned about it or correlated with it.

THOUGHTS AND THINGS

In 1756, Edmund Burke, in his "Essay on the Sublime and Beautiful," concluded with a section on the way in which words are able to affect us. This involved him also in a comparison of the effects of poetry and painting. We are especially interested in the account of the mechanism of verbal efficacy.

The general account which he gives is to the effect that words are substitute stimuli for other objects or occasions with which they have been associated. He rejects the theory that words operate by first arousing images of these objects or occasions. Instead, having previously been part of a situation in which the object was also present, the word now functions as partial stimulus or detail to instigate the same reaction as that which might be instigated by the total context.

This is strictly a case of the conditioned reaction, if we suppose that the word was introduced into the situation only after the situation itself had been several times experienced, and its characteristic effects determined. Or, if we suppose that the word may also be a partial detail of the very first occasion, then we have the most general case, which we have called the "mechanism of redintegration."

The difficulty most commonly experienced with this account is met when it is maintained that any "object," as a "bank note," the "tail of a rabbit," "an incipient movement," "a posture," and so on, may actually constitute a *thought*. Burke's account of the signatory function of *auditory objects* (words) is usually readily accepted as at least an intelligible account, and that words may *constitute* thoughts is not with difficulty admitted. The difficulty comes when other varieties of objects—visual, muscular, tactual objects, and the like—are also asserted to *be* thoughts, on such occasions as those in which they serve as signs.

Burke first points out that "Natural objects affect us by the laws of that connection which Providence has established between certain motions and configurations of bodies, and certain consequent feelings in our mind." He then shows that words also affect us, but by a different law, and inquires into the nature of this law.

First he shows, by citing his own observations, inquiries of friends, and certain special cases studied in some detail, that the power of words does not come through their arousal of imagery—which imagery may then affect us directly: "They seem to me to affect us in a manner very different from that in which we are affected by natural objects."

He then proceeds to show that words affect us by the mechanism of "substitution"; they operate "not by presenting any image to the mind, but by having from use the same effect on being mentioned that their original has when seen."

"Such words are in reality but mere sounds; but they are sounds which being used on particular occasions, wherein we receive some good or suffer some evil, or see others affected with good or evil: or which we hear applied to other interesting things or events: and being applied in such a variety of cases that we know readily by habit to what things they belong, they produce in the mind, whenever they are afterwards mentioned, effects similar to those of their occasions."

"If I say 'I shall go to Italy next summer,' I am well understood. Yet I believe nobody has by this painted in his imagination the exact figure of the speaker passing by land or by water, or both: sometimes on horseback, sometimes in a carriage; with all the particulars of the journey. Still less has he any idea of Italy, the country to which I propose to go; or of the greenness of the fields, the ripening of the fruits, and the warmth of the air, with the change to this from a different season, which are the ideas for which the word *summer* is *substituted*. . . . In short, it is not only of those ideas which are commonly called abstract, and of which no image at all can be formed, but even of particular, real beings, that we converse without having any idea of them excited in the imagination; as will appear on a diligent examination of our minds."

He then proceeds to show that, depending on the appropriate selection of the words, and by their expressive inflection and utterance, they may be made to produce even greater effects upon the listener or reader than would the mere presence of the objects for which they are substituted. This he believes is the secret of the greater power which poetry has over painting, since the latter is so largely reproductive or imitative, that is strictly representative.

The power of words, that is to say, comes from their signature value, from their substitutive rôle, from their vicarious functioning, their redintegrative efficacy.

If Burke's "nominalistic" account of the effect of poetry be acceptable, then there is no reason why it may not be extended to cover the thinking of a more prosaic order. And this, as we have intimated, is readily assented to. But a slight correction of Burke's account is all that is needed to extend the *substitute* rôle to other objects as well. This correction consists in pointing out that Burke was in error when he drew the sharp distinction between words and what he calls "natural objects," by which he presumably meant "visual objects" and "tangible objects." But words also are natural objects. They are however "auditory objects," and as such they are also brief and fleeting.

Bertrand Russell has clearly stated this "object" character of words, a character which is readily forgotten, even by the usual student of psychology. Russell[3] writes: "Let us consider first what sort of object a word is when considered simply as a physical thing, apart from its meaning. To begin with, there are many instances of a word, namely all the different occasions when it is employed. Thus a word is not something unique and particular, but a set of occurrences. If we confine ourselves to spoken words, a word has two aspects, according as we regard it from the point of view of the speaker or from that of the hearer. From the point of view of the speaker, a single instance of the use of a word consists of a certain set of movements in the throat and mouth, combined with breath. From the point of view of the hearer, a single instance of the use of a word consists of a certain series of sounds, each being approximately represented by a single letter in writing."

If the reader once really appreciates the fact that a word, whether spoken, heard, written, or seen, is a natural event, an actual physical object, in the same class with chairs, cyclones, houses, and rainbows, it should not be difficult to agree that a physical event may be all that constitutes a thought. Once this is done, we have attained the end for which we have been seeking—the recognition that thought is characterized not by any peculiarity of its intrinsic make-up or nature, but alone by its function.

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[3] *The Analysis of Mind,* p. 188.

That this difficulty is more than an historic one, is clearly shown in one of the most penetrating of recent attempts to outline the psychology of meaning, in the volume *The Meaning of Meaning,* by Ogden and Richards. Here the part-whole substitutive mechanism is definitely adopted in describing the nature of verbal symbols. But there is obtruded into the situation a more or less mystical mode of mental activity, namely, "thoughts," which "words always symbolize."[4] What these thoughts or "references" are is never revealed, although it is surmised "that thought . . . can dispense with symbols"[5] in certain of its forms at least. It seems clear from our point of view that what these authors call "thoughts" as distinguished from "symbols" are *only other symbols* of the nonverbal sort—feelings, attitudes, postures, tensions, images, and the like. The failure to apprehend this is what prevents this diverting and instructive volume from really exhibiting the nature of meaning when verbal meanings are not involved. Briefly stated, the volume referred to is a striking illustration of the difficulty of making headway with the redintegrative mechanism without adopting also the doctrine of the psychophysical continuum.

There is, to be sure, one sense in which it may sometimes seem useful to distinguish between "ideas" and such other symbols as may serve as counters or tokens—such as maps, diagrams, signs, pictures, and emblems. Some of the symbols used in dealing with absent objects are reportable only by the individual using them. Others have that consistency and unanimity of report that, as we have seen, lead us to call them social or physical objects. Therefore the statement may be made that some symbols occur in the thinker's own organism, while others occur outside it. If it be carefully borne in mind that all alike are natural events, and that the number of possible reporters is after all only a numerical difference, the distinction between "ideas" and "objective symbols" may serve some useful end.

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[4] Ogden and Richards, *The Meaning of Meaning,* p. 198.

[5] *Ibid.,* p. 19.

But, as history shows, it is much more likely to lead to grosser problems than it solves. It is this distinction that has given rise to that hopeless muddle of artificial riddles to which the inquiring student of philosophy is first introduced—the futile conundrums of subjectivism, dualism, mind-body relation, structuralism, parallelism, and "why the mind has a body." The history of philosophy thus warns the psychologist against mistaking a statistical difference for an essential distinction.

CONFIDENCE AND DEVELOPMENT

Other topics call for consideration at this point, but we can for the present only indicate their character. The first is the fact of confidence or belief, and its varying degrees. Certainty varies with the fullness or completeness of signature. If only a small part of the whole is present, certainty is low. It rises the more completely the whole is reproduced. Certainty of judgment, that is, confidence or belief, varies with the amount of data, and it is this also which gives the transition from judgment to full perception. Clouds are the sign of rain, but if only this element is present, the certainty is low. Other facts are also indicators, that is, partial conditions, and the whole is there only when the rain is there also. Primitive magic erred by placing too great confidence on minor details. We progress beyond this either by more complete enumeration of signs or by the discrimination of degrees of relevance. Primitive magic thus resembles the reliance on secondary criteria in judgment experiments. But the general problem of belief is so far-reaching that it cannot be further considered at this point.

The second point has to do with the genetic aspect of meaning. Meaning seems in a sense to develop from identity, through similarity, to contiguity, as the basis of its occurrence. This fact is perhaps the basis of Russell's curious conviction that meaning has always a primary imaginal origin. Thus early language, especially graphic language, was imitative or reproductive, pictorial. Later a definite but minor similarity sufficed between sign and signified. The pictographic stage in time gave way to the use of conventionalized graphs and more or less arbitrary signs, through contiguous association. Letters, words, inflections, affixes, internal word variations, differences of order, and the like, all come to be meaningful. D-o-g no longer portrays nor even resembles either the sound or the animal for which it stands.

In the same way the "representative image" gives way to the associated detail as the "bearer of meaning." Now, similarity is redintegrative in its basis. It is the presence of a partial detail in both sign and signified that is effective. The part of the one functions for the whole of the other. And contiguity is another part-whole relation. It is apparently a more remote or difficult form, only to be utilized at a higher level of intelligence. Is this perhaps why the idiot is limited to mimetic gesture and does not acquire speech, and why the imbecile is limited to spoken language?

THE PROBLEM OF IDENTITY

We cannot at this time consider in detail another difficult point in connection with our whole account of meaning, namely, the use of such terms as "the same response." This involves the whole logical problem of identity, which in another connection may well be more carefully exploited. Briefly, this problem must be approached not through the way of "universals" but by the aid of the doctrine of "classes." For our present purpose such expressions as "the same event," the "same detail," the "same response" can more accurately be rendered "a detail, event, or response belonging to the same class," or even "details, events, or responses indistinguishable from others for a given purpose."

In the meaningful sequence, the reaction or consequent is, of course, not precisely identical with an earlier one, even aside from the logical difficulty. The fact is merely that no difference is discernible from the point of view of the given or particular situation, purpose, task, or instruction. Thus in experiments on discrimination, reliance on secondary details or criteria may not produce reactions equivalent in all respects to those based on primary comparisons. But for the purpose of the experiment, that is, for the purpose of revealing thresholds, it may lead to the same or equivalent verdicts, identical verbal responses, and so on. Similarly, the reaction to a thought burglar is not in all details indiscriminable from that to an actual one; it may be indiscernible only in its autonomic aspects or perhaps only in its verbal associative efficacy.

Even in the neuroses, where the redintegrative mechanism is so conspicuously illustrated, the hysteric symptom is perhaps descriptively incomplete as compared with the original reaction to the complete event. But both reactions belong to the same class, are intelligibly characterized by the same general name, lead to equivalent types of incapacity, and so on.

The essential point is that the psychology of thought need not become involved in the riddle of "universals," as propounded by the idealistic logicians. Even slot machines classify objects. To any one of a great number of inserted objects the machine reacts by "ejecting a piece of gum." To any one of a greater number of objects it makes no such reaction. The reason is to be found in the construction of the machine, rather than in the "pennyness" of the coins. The "identity" involved is the unchanging character of the machine, not the "essence" of pieces of money. Identity is only absence of change, and change is always a succession of particulars.

These minor problems, that of the nature of confidence, that of the genesis of meaning, that of the character of identity, and that of the actual incompleteness of the response to partial details, all have a systematic interest. But their final disposition has no specific relation to the general account of the mechanism of meaning and the nature of thinking.

CHAPTER XV

THE DIFFERENTIA OF REASONING

> It seems to be an odd subject of dispute with any man, whether he has ideas in his mind or not. Of this, at first view, every man, in his own forum, ought to judge without appeal. But strange as it may appear, we are often at a loss to know what ideas we have of things, or whether we have any ideas at all. . . .
>
> EDMUND BURKE

PURPOSE, PROBLEM, AND MOTIVE

The problem of Aim, Motive, or Purpose in thinking comes out clearly in the distinction between free and controlled association or action. The classical illustration of the two types of associative trains, the one random, the other persisting in a given direction, is that given by Hobbes in *Leviathan*. In a similar way, the dream differs from the solution of a geometrical problem, or the making of a decision in terms of thought. And the so-called "free association experiment" is supposed likewise to differ essentially from the controlled case. In controlled thinking one "has an aim in mind," thought is "directed by a purpose," or "centers round a problem."

The nature of this control has been variously conceived, and it is of considerable interest to us, because reflective thinking may seem not to consist of *mere redintegration*. Drowsiness hallucinations, dreams, and incoherent babblings, it will be said, may illustrate *mere* redintegration, but *something more* is present in deliberate reflection, in active thinking. What is this something more? Is it something different, some occult "energy," some special "faculty," the activity of a "pure thought"? Or is it perhaps only *more redintegration?* And if the latter, in just what does the addition consist? What, precisely and descriptively, is the nature of a motive, an aim or control; what is the *Aufgabe,* the determining tendency? If, for example, in the account of the mechanism of the neuroses, "motivation" must be added to "redintegration," in what terms is the motivation to be conceived?

TERMINOLOGY OF COMMON SENSE

Common speech says, the thinker "has an aim." He "aims to find a lost object, to solve a puzzle." Or, "His aim is to be a rich man." In general, the notion of "aim" applies to overt act as well as to what we more usually call thought, since we commonly distinguish conduct from thought in this fashion. Now it is easy to start from these common-sense expressions and to conclude, much as does McDougall in his *Outline,* a peculiar occult power directing the activity of the body, and derived from the extra bodily "instincts." The "purpose" in this way becomes a hidden and vitalistic or animistic entity.

But it is an error to suppose that common speech intends to conform to the exact details of descriptive psychology. Common speech is in terms of general symbols, and indicates general situations that have resemblance only in their practical outcome. This is sometimes expressed by saying that common speech deals with "meanings" rather than with "processes." Common speech can be readily paraphrased, to its entire satisfaction, without committing it to any system of psychology, whether purposive or otherwise. When, in such speech, we say, "His aim is to be a rich man," all we mean to do is to indicate a type of situation which, if realized, would bring the man satisfaction, terminate or change his mode of action. Such a "situation" is a logical concept or "meaning," that is, it is a past object which can be indicated by the use of language. The "aim" of common speech is not, then, something "in the mind" of the actor; it is satisfied by such paraphrasing as "If he were rich he would be contented."

But if common sense should begin to psychologize it would probably insist at once that *something* must be present in the man's experience that *represents* this indicated situation, and that if this symbol were not there, accompanied by a certain namable unrest, the man's conduct would be different. *What* this "symbol" is, common sense does not pretend to say. And when McDougal insists that it is a peculiar mental energy he is not even translating common sense, as he supposes himself to be; he is making gratuitous assumptions.

The simple fact seems to be that in random thinking only one cue is required at a time—one image leads to another, one act to a second, one word to its successor. This leading or instigating may be by way of mere association of the habit type, which is a purely physical phenomenon in the only sense in which we can justify the use of that term; or the succession of events may be of the redintegrative type, in which the detail functions for an historic whole, as in many ordinary cases of perception.

But in reflective thought, that is, in aiming or purposive thinking (or acting) at least two cues are required. The one is the present detail that functions, as in random thinking, redintegratively in instigating a consequent event or in mere associative reproduction. The other cue is a second detail that in some way functions in determining the *direction* of the redintegration or of the reproduction; that is, determines *which* past context shall on this occasion be effective. It thus prescribes the *field* within which the instigated consequent shall lie.

REASONING INVOLVES TWO CUES

A simple mechanical analogy may serve to illustrate what seems to be required in such a case. Take, for example, the running of an automobile or the driving of a horse. In driving a horse two stimuli seem to be required for successful management. In the first place there is the stimulus that sets the horse going or keeps him going. This may be a spoken word, a flick with the whip, or the presence of the taut reins. In the second place, there is the guiding pressure on the bit which, as it shifts from point to point, directs the horse now in this direction, now in that. The motion goes on in a simple mechanical fashion, so far as we can see, but it goes on in a certain field or in a certain direction that is determined by the specifying bit pressure.

So in the still simpler case of the automobile. The movement of the car is determined mechanically by the transmission connections with the active engine. But the motion does not go on indiscriminately; the car goes now here, now there, according to the manipulation of the steering gear. One series of connections gives the propulsion, the other gives the direction or aim. Something like this situation seems to be present in purposive action or thought.

As a transition case between these instances of directed machines and active thinking, we may profitably consider the ordinary process of reading, especially in the case of equivocal words. Some words, proper names for example, are so specific in their reference that no obvious determining clue seems required for their proper understanding. Thus, "Abraham Lincoln" leads to a given "meaning" even when it occurs outside of any general verbal context. That some specifying clue functions even in this case cannot be doubted, but it is not easy to point definitely to it—it is perhaps some detail of attitude or innervation that differentiates "reading" from merely "looking at."

But many words have more than one meaning, and which meaning is to be effective on a given occasion depends on the context in which the word is employed. Such words, for example, are "fast," "post," "stay," "head," and the like. For such a word to have a particular meaning is for it to instigate a specific successor, whether this successor be an image, an act, or an implicit attitude or feeling. In such a case we have a clear example of the difference between "instigating" and "specifying" details. The general *direction* of the instigation is laid down by the preceding words, seen or heard or by the attitudes instigated by them. Either the preceding words of the sentence may perseverate, or the instigated attitude corresponding to them may persist. What meaning a present word possesses thus depends not only on that word itself but also upon foregoing words, which are still *now* but no longer here, that is to say their attentional status is marginal.

We may quote a classical consideration of this process from the pages of William James who writes:[1]

> Take . . . the two verses from *Locksley Hall*:
> "I, the heir of all *the ages* in the foremost files of time"
> and
> "For I doubt not through the ages one increasing purpose runs."
>
> Why is it that when we recite from memory one of these lines, and get as far as *the ages,* that portion of the *other* line which follows, and, so to speak, sprouts out of the ages, does not also sprout out of our memory, and confuse the sense of our words? Simply because the word that follows *the ages* has its brain process awakened not simply by the brain processes of *the ages* alone, but by it *plus* the brain processes of all the words preceding the *ages.* . . . *"In"* and not *"one"* or any other word will be the next to awaken (when the processes *"I, the heir of all the ages"* simultaneously vibrate in the brain) for its brain process has previously vibrated in unison not only with that of *ages* but with that of all those other words whose activity is dying away.

The illustration of James is drawn from the field of verbal memory. Our previous illustration was from the case of active reading of new materials. In both cases the associative effectiveness, the instigating function of the given word was twice determined, or perhaps we should say instead, determined half in each of two places. We have now to suggest that in what we call thinking this same twofold determination is required.

SPECIFYING AND INSTIGATING DETAILS

We may begin with simple cases in which both cues are obviously present together. Thus, if a sketchy visual image of a map means for me "finding the way to go," then, under the specifying influence of this control, incipient or tentative gestures to the right and the left "mean" east and west. But if instead of the sketchy visual map image being present, what is present is the preservating phrase "Battle of Lexington," this may give a different specification to right and left gestures. They now indicate minute men and red coats respectively.

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[1] *Principles of Psychology,* Vol. I, p. 567.

That is to say, a given gesture will lead associatively in a very different direction (that is, to different consequents) in the two cases, but in either case its leading may be of a redintegrative or meaningful sort. The *present* detail functions for a larger historic whole, but it does so *within* a larger redintegrated field instigated by the controlling cue. The "present" detail is the detail that is "here and now," and it is rather interesting that the word present refers both to time and to space; it is what has been traditionally called the "conscious."

But the control detail, we have suggested, must also be "present" if it is to be "effective." And so it is present, in time, but not in space. That is, the instigating detail is both *here* and *now*. The control detail, however, may be only *now* but not *here*. That is to say, it may be effective at the moment, but not in the focus of attention—not at the point indicated for the instigating detail. It is the failure to distinguish between these two kinds of *presence,* the temporal and the spatial, that has led to the frequent assertion that the control may function *unconsciously.*

In both these illustrations we have pointed to actual events, the sketchy visual image and the perseverating words, as constituting the second or controlling detail. It is well to use two specific terms for these two functions, and I prefer the terms "specifying" and "instigating" to the more commonly used terms "determining tendency" and "stimulus." The latter two terms tend to evaporate the specifying detail into some "purely mental" kind of stuff, and to crystallize the instigating detail into some "purely physical" source of energy. Whereas, in fact, both specifying and instigating detail are alike "natural events."

Two particular problems arise in connection with the question of the "control idea." The first is the problem of its descriptive nature in general or in any given instance. The second is the problem of its persistence: Why is its effectiveness prolonged so as to cover the temporal existence of several instigating details, or a long redintegrative series of terms? Both these problems are considered with rare insight by Washburn in her volume on *Movement and Mental Imagery,* a volume which will some day meet with far more nearly adequate appreciation than seems yet to have been accorded it. Washburn not only reviews various suggestions that others have made in this connection but presents an ingenious attempt to solve the two problems according to conceptions of her own.

THE NATURE OF THE CONTROL IDEA

The memory after image, it is shown, cannot alone constitute the "problem" or "purpose," because of its brief duration. Besides, there are plenty of after effects that do not come to constitute control ideas. Both Groos and Schaefer have suggested this after function as the basis of associative control.

Müller and Offner suggest spontaneous perseveration of the "problem idea" as the basis of the subsequent persistent direction of thought and action. But "the human mind would be a very inefficient instrument if its plans and purposes had as fitful a tendency to recur and persist in their influence as the perseverative tendency of a tune."

Watt offers the concept of "greater and stronger reproduction motive"; Müller suggests "constellation," that is "combination of associative tendencies." Claparede suggests an affective factor, the "sentiment of the end." Meumann and Ach introduce unique factors that are merely named, and not easily understood in other terms than their own. Rignano maintains that the "affect" is the guiding or controlling factor.

More recently the terms "determining tendency," "task," "mental set," *Aufgabe,* "drive," "motive," and "tendency" have been much used in this connection. All of these seem to indicate a function but not clearly to describe what it is that functions. The same objection applies to the concept of "purpose," which is often resorted to in moments of despair.

Washburn offers definite suggestions in the concept of the "activity attitude." "If the motor excitation on which an idea is based can be associated with an internal static movement system, it will acquire the persistence needed to transform the idea into a problem idea."[2] "A determining tendency is an associative disposition one of whose exciting influences is the activity attitude." This activity attitude is a static movement system, connected with the arousal of a desire or instinctive urge, and is, in its more intense forms, "a bodily attitude, involving a kind of intense quietness, a quietness due not to relaxation but to a system of static innervations." It is "revealed to introspection as the 'feeling of effort,' which is recognized as the accompaniment of active attention."

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[2] *Movement and Mental Imagery,* p. 159.

So far as Washburn is concerned, then, *any idea* may become a problem idea, and problem ideas are the same in kind as other ideas. But problem ideas are more persistent, and this persistence is derived from the activity attitude, connected with the arousal of an instinctive tendency or desire. But since the basis of every "idea" is for Washburn a movement or a movement system, it would follow that the control idea must be or correspond to an innervation, contraction, relaxation, or tension, some sort of motor process in the organism, which, in its rôle as idea stands as the symbol of some larger whole.

A somewhat similar account is offered by Woodworth in his *Dynamic Psychology,* as follows:[3]

> A typical series of events is the following: a sound or light strikes the sense organ and arouses the appropriate attentive reaction; this permits a stimulus of significance to the animal to take effect—for example, the sight of prey, which arouses a trend towards the consummatory reaction of devouring it. But this consummatory reaction cannot at once take place; what does take place is the preparatory reaction of stalking or pursuing the prey. The series of preparatory reactions may be very complicated, and it is evidently driven by the trend toward the consummatory reaction.
>
> That there is a persistent inner tendency towards the consummatory reaction is seen when, for instance, a hunting dog loses the trail; if he were simply carried along from one detail of the hunting process to another by a succession of stimuli calling out simple reflexes, he would cease hunting as

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[3] *Dynamic Psychology,* pp. 41, 42.

> soon as the trail ceased or follow it back again; whereas what he does is to explore about, seeking the trail, as we say.
>
> This seeking, not being evoked by any external stimulus (but rather by the absence of an external stimulus) must be driven by some internal force; and the circumstances make it clear that the inner drive is directed toward the capture of the prey.
>
> The dog's behavior is to be interpreted as follows: the mechanism for a consummatory reaction, having been set into activity by a suitable stimulus, acts as a drive operating other mechanisms which give the preparatory reactions. Each preparatory reaction may be a response in part to some external stimulus, but it is facilitated by the drive towards the consummatory reaction. Not only are some reactions thus facilitated, but others which in other circumstances would be evoked by external stimuli are inhibited. . . .
>
> "Drive" as we have thus been led to conceive of it in the simpler sort of case, is not essentially distinct from "mechanism." The drive is a mechanism already aroused and thus in position to furnish stimulation to other mechanisms. Any mechanism might be a drive.
>
> But it is the mechanisms directed towards consummatory reactions—whether of the simpler sort seen in animals or of the more complex sort exemplified by human desires and motives—that are most likely to act as drives. Some mechanisms act at once and relapse into quiet, while others can only bring their action to completion by first arousing other mechanisms.
>
> But there is no absolute distinction, and it will be well to bear in mind the possibility that any mechanism may be under certain circumstances the source of stimulation that arouses other mechanisms to activity.

In order to have this view clearly before us, we must inquire into Woodworth's conception of the nature of "drive" and the nature of a "mechanism." The notion of drive is clearly expressed in the following:[4]

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[4] *Ibid*, pp. 39, 40.

Still the conception of "drive" would have little significance if the activity aroused in any center lasted only as long as the external stimulus acting upon it through a sensory nerve; for, taken as a whole, the organism would still be passive and simply responsive to the complex of external stimuli acting on it at any moment. It is therefore a very important fact, for our purpose, that a nerve center, aroused to activity, does not in all cases relapse into quiescence, after a momentary discharge. Its state of activity may outlast the stimulus that aroused it, and this residual activity in one center may act as drive to another center. Or a center may be "sub-excited" by an external stimulus that is not capable of arousing it to full discharge; and while thus sub-excited, it may influence other centers, either by way of reinforcement or by way of inhibition. Thus, though the drive for nerve activity may be ultimately external, at any one moment there are internal sources of influence furnishing drive to other parts of the system.

The author points out that if all activity were of the simple reflex type, the sense organ, sensory nerve, center, motor nerve, and muscle would comprise a unitary "mechanism" and the external stimulus would then be the "drive." But a "motive" is felt to be something "internal," and the author then suggests that "we can work our way up from the drive as external stimulus to the drive as inner motive." He shows, from the familiar facts of "facilitation" and "inhibition," that "the drive is not entirely the local stimulus, but other centers in the brain and spinal cord, being themselves aroused from the outside, furnish drive from the center that is directly responsible for the movement." "If one nerve center can thus furnish drive for another, there is some sense in speaking of drives" (as distinguished from mechanism and stimuli). Moreover, he suggests at an earlier point that "it may be true in our case, also, that the question of drive is reducible to a question of mechanism, but there is prima-facie justification for making the distinction."

In general these two accounts, that of Washburn (1916) and that of Woodworth (1918), are at least consistent. For Washburn the motive is "task idea," linked up with the "activity attitude." For Woodworth it is "a mechanism directed toward a consummatory reaction," aroused by an external stimulus. For Washburn the motive is a "static movement system," for Woodworth it is a trend to action based on perseverating or dammed-up nervous energy. Both suggest its relation to the "attentive reaction." Both point out the necessity of the two cues, the specifying and the instigating. But the terms used in describing the cues differ somewhat. For Washburn the cues are motor processes, overt or tentative, since "only movements are associated." For Woodworth the cues are "mechanisms," that is, nerve-muscle systems that may be activated—at least, the "inner cue" or *motive* is such an active nerve center; the instigating cue, so far as he describes it, is more likely to be an external stimulus.

The energy or drive, considered in itself, is for Washburn the fact of "association," that is, associative arousal or sequence. For Woodworth it is communication of energy, that is, stimulative sequence. Now it is rather interesting that a man, if interrogated, would be likely to insist that his "motive" in a given case was neither a nerve center nor a movement system. He would perhaps insist that instead it was a certain "idea" or "memory" or "feeling." Woodworth makes no provision for such an obstinate man, unless perhaps he should take a clear parallelist stand, and admit that "feelings" went *along with* active nerve centers, but were not really *effective.* Washburn makes a certain provision for the obstinate man, in so far as she systematically insists only that the *basis* of every idea is a movement or movement system. Neither gives a sufficient account of the epistemological and metaphysical implications of the doctrine advocated. Washburn explicitly adopts the attitude of parallelism. Woodworth, making no final commitment, deals, however, only with the presumed neurology.

THE DETERMINING TENDENCIES

We have here precisely the problem of the *Aufgabe* as it has appeared in the recent studies of action and thought, when it is shown that in voluntary action, judgment, and in general in the so-called "higher forms" of mental life, it is the stimulus *plus a determining tendency* that combine to produce the reaction. Thus Watt writes (Titchener's translation):[5]

> A preparation that is common to all problems alike consists in a certain adjustment of the body. The observer directs his gaze, more or less attentively, and in a state of expectation that is accompanied by strain sensations of more or less vivacity, upon the screen that conceals the stimulus word. Now he will say the name of the problem two or three times over to himself: subordinate idea, superordinate idea, find a part, etc.; perhaps he will think of two or three instances. This process is fairly clear in consciousness at the beginning of the series, and especially on the change to a new problem; but it weakens with time, so that in the second or third experiment the name of the problem is said once

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[5] *Experimental Psychology of the Thought Processes,* p. 122.

> only, and finally internal speech lapses altogether and the conscious tension almost wholly disappears. All that remains therefore is the adjustment of the body—the fixation of the screen, the approach of the lips to the voice key, etc.—and a state of faint expectancy. This is the course of events when the problem is easy and the observer has grown used to the experimental procedure.

But the tendency is then to assert that the problem quite disappears from consciousness, and yet remains effective in specifying the direction of the reaction when the stimulus arrives. Thus Watt defines the judgment as "a sequence of experiences whose procession from its first term, the stimulus, has been determined by a psychological factor now past as conscious experience, but persisting as an appreciable influence."

Others, as those of the Titchenerian school, insist on finding the *Aufgabe* analyzable into some or other details of sensory experience, especially slight kinæsthetic factors likely to be overlooked by the ordinary observer. From our present point of view such possibility of analysis is inevitable. We require that *some* detail be present as a specifying factor, along with the instigating stimulus. That the detail may be slight and sketchy, and much degenerated beyond its original form, is quite to be expected. This is just what makes of it a mental influence; whatever the detail is, it functions symbolically, that is, redintegratively, for the larger whole of which it was once a part. So that the reduced and faded, merely attitudinal experiences, slight strains, fragments of image, traces of feeling, and the like, may actually constitute the *Aufgabe* as it is now represented.

But this is very different from saying that the *Aufgabe* has "lapsed from consciousness." If it *has* lapsed from consciousness then we are no longer dealing with a thought process, but merely with the habitual activity of a machine. And many of the processes studied in laboratory experiments speedily reduce themselves to machinelike acts. This is what Titchener means when he says that action comes to be determined by mere "nerve forces."

Or we may perhaps take another way out. The statement that the determiner is "unconscious" implies some reporter who does not know it. But other reporters may know it. The question of consciousness or unconsciousness is then merely a matter of which or how many observers are able to report the event. If the actor is unable to report it, but the experimenter is able to determine that the factor is operating, or that as historic fact its influence is still potent, the determiner is *not* unconscious to the experimenter.

The problem of consciousness thus resolves itself into the more or less trivial matter of which of the possible observers can make the report—whether all of them, or only all but one. Except from the point of view of a very special set of assumptions, then, the question of "consciousness of the determiner" has relatively little importance.

The question then becomes whether or not we are still to call these machinelike habitual or automatic acts "thinking." Is the accountant, who merely sits mechanically adding up columns of figures really thinking? We may suppose that he has lost all discoverable trace of anything that may be called "problem consciousness."

Our only conclusion must be that this process is still to be called "mental," so long as the acts are redintegratively determined—so long, that is, as his movements are not merely mechanically produced by the transfer of energy from the present stimulus. If the detail functions for larger wholes, his work is mental. But it is not therefore necessarily *thinking,* nor is his action *voluntary.* We may, that is, restrict our term *thinking* to those cases in which a present specifying detail coöperates with a present instigating detail to induce an appropriate consequent. There are many mental activities besides *thinking,* and all that will distinguish thought from voluntary action will be the symbolic character of the details and acts that come into play in the former.

REASONING AND VOLUNTARY ACTION

The distinction between the two will be, in fact, a very loose one. In so far as a mental process is to be designated, it is voluntary; that is to say, it follows a specifying as well as an instigating clue or detail. And in so far as action is voluntary, it is thoughtful; that is, it follows the redintegrative pattern. Thinking is a voluntary act and voluntary action may take the form of thought.

Perhaps some slight difficulty will be encountered in the case of the redintegrative actions of the neurotic. These we are likely to say are "involuntary" and that their involuntariness is what makes them neurotic. But what we mean in these instances is that the acts are coercive and insistent; they are not easily subjugated by other controls. But this does not make them involuntary, it merely makes them insistent or powerful.

The strictly involuntary is the reflex or the physical—the act in which a given total stimulus is by original nature required for the instigation of the consequent, with no obvious conformity to the redintegrative pattern of sequence. In the strictest sense of the term the actions of the neurotic are "under control," but the control may not be the one socially or at the moment desired. In so far, then, as a consequent requires but a single cue, the instigating one, we class it as involuntary, reflex, physical, providing that the sequence be not redintegrative. In so far as the control is dual—in so far, that is, as the act results from the joint influence of the specifying and the instigating details or antecedents—we class it as voluntary, providing that the sequence follows the redintegrative pattern. Whether or not it be thinking is rather a matter of whether the act or consequent itself is a complete and overt adjustment or whether it is also symbolic, that is, calculated to act as a partial detail or sign for the instigation of further consequents.

SPECIAL DIFFICULTIES OF REPORT

In motivated sequence then, in problem solving or reasoning, there are at least two cues involved. The one, the detail that descriptively constitutes the *motive,* is a cue which redintegratively functions for some antecedent complexity, in arousing or facilitating a general set of consequents. These are not overtly realized except in so far as some instigating clue leads to their actual or complete occurrence. In being tentative or implicit, that is to say, they are themselves only symbolically or incompletely present.

When asked to *describe* such a motive clue, it leads promptly, in connection with the instructions, to words, gestures, or other symbolic indications of the same total complexity which it also *represents*. Hence the usual account of the motive is not an exhibition of it but merely a set of synonyms for the symbol at the previous moment functioning for it.

This is the rule in nearly all definition. In practical life, for example, one "goes to the dictionary" to "find the meaning" of a word. But all that the dictionary furnishes is another symbol, an equivalent, a synonym, or at most a representative drawing. Strictly, the meaning, say, of the German word *Hund,* is not its English equivalent. This is but another symbol. The meaning (signified) of the word will be found not in the dictionary but in the kennel.

Similarly, in the naïve report of a motive, what is usually given is only a verbal equivalent, that is, *another motive* with the same meaning. This is what Titchener so vigorously condemns as only "indication of meaning," not to be confused with "report of process." Descriptively the motive is always some present detail—image, word, object, feeling, attitude, movement—functioning for an antecedent and historic complexity, of which it was once a part.

ENDURING AND TRANSITORY DETAILS

The specifying rôle may shift from moment to moment, now to one detail, now to another, as we have seen to be the case with any thought. However fragmentary, shifting, or apparently irrelevant the detail event may be, faithful observation should be able to report its presence. When such report is no longer possible, rational and motivated process has degenerated to mere redintegrative sequence or to mere physical succession. The instigating detail then functions alone, or at least without the determination given by the enduring specifying clue.

This relative permanence of the specifying clue is an important feature of it, as distinguished from the instigating detail. The former persists as an enduring influence, within the sphere of which many instigating clues in turn function and lapse. The mere joint operation of several instigating details—for example, darkness, strange sounds, and a slinking visual form—does not suffice to constitute reasoning. All actual sequences are likely to be thus complexly determined. This is why the simple redintegrative paradigm may seem so inadequate to account for the complexities of actual thought.

But reasoning as a process not only involves at least duality, and perhaps multiplicity of clues; it requires also the joint operation of at least one enduring clue and a certain number of transitory ones. This need for endurance is one reason why motives are so commonly constituted by kinæsthetic processes—by attitudinal, postural, and motor events, or by autonomic events, such as organic and intraorganic processes and conditions (hunger, fatigue, fear, excitement). And it is for this reason that the motive has so traditionally been supposed to be an "inner" process, and hence, by a natural but fallacious extension, a "subjective" or "purely psychic" affair, an occult energy.

SCHOLASTICISM AND VITALISM

Such an occult view of thinking has been advocated, more or less definitely, throughout the history of psychology. In earlier epochs this doctrine simply took the form of asserting the existence of a special "rational principle" or "thinking faculty," to which were subordinated the simpler forms of perceptual and imaginal experience. In scholastic accounts, again, special thought forms are supposed to correspond more or less definitely to the abstract conceptual categories and structures of logical discourse. More recently, in a psychology that is in many ways a form of revived scholasticism, somewhat similar doctrines are advanced. Thus the "control" processes in thinking are supposed to be constituted by special forms of "knowing" which lie beyond the conscious realm and manifest themselves only by the direction which they exert upon conscious processes. These abstract forms of knowledge and intention thus "actualize" themselves in the form of imagery, vocalization, gestures, and in the control of attention and selection. Such words as *wissen, Bewusstheit, Wissensaktualizierung,* and the like, are in use by German advocates (Bühler, Selz) of this point of view, which is also in many ways like the transcendentalist account of thinking developed especially by the British logicians, such as Bradley and Bosanquet.

Not unrelated to this neoscholasticism is the animistic account of thinking given by the self-styled "hormic" school, the purposivists or vitalists of psychology. These writers, illustrated by McDougall, finding it especially difficult to give a straightforward descriptive account of the control processes, abandon the effort at analysis and description, invoking instead a unique world of psychic structures, inhabited by such superphenomenal entities and agents as "Purposes," "Wishes," "Meanings," "Psychic Energies," and the like. As is in general the case with the vitalistic point of view, this doctrine represents only a highly dramatized attempt to capitalize and exploit our ignorance. At just those points where actual understanding is missing in our account of thinking, this doctrine offers a word (such as "purpose" or "meaning") as a substitute for understanding. And all riddles of science are solved by substituting for them an array of insoluble concepts. Whether the forces supposed to be indicated by these concepts lie in the subconscious, or in the soul, or in a purely abstract and inferred realm of mental structures, makes little difference in their intelligibility.

A straightforward descriptive account of thinking may perfectly well utilize inference. Thus it may infer the influence of factors and items which are not at a given moment open to inspection or accessible to observation. But, in general, it limits its inferences to items or factors of a known nature, that is, to features which resemble the ordinary objects of description. Thus pains, images, and the like, may on a given occasion be inferred, even if not actually observed. But these types of object are first well known through direct experience with them. The scholastics and the animists, however, violate this general rule. The factors inferred by them are not further processes, momentarily not observable, of a well understood nature. Instead they are, in general, unique, unanalyzable, occult, and not further describable processes, existing in a superphenomenal realm, which is therefore not accessible to empirical observation nor to the technique of scientific examination or experiment. We do not further consider either of these points of view, since we do not believe that ignorance is in any sense diminished by being clothed in mystical and high-sounding terminology.

THE MOTIVE IS ANOTHER STIMULUS

The motive is only another stimulus. It is perhaps especially likely to be an internal stimulus. By this, however, we must not mean a stimulus "within the mind," but instead an intrabodily event, a process going on in the organism rather than beyond the skin. Thus when a caged experimental animal rushes frantically against the bars of his cage, toward the food that is placed outside, we say that the *motive* is that of *hunger*. But hunger is not an occult force, existing in a mythical world of "mental structures" or "instincts." Hunger is an actual bodily event or stimulus. It is known to the animal, or may be, as a specific kind of "pang." It may be known to the visual observer as "contractile or churning movements of the animal's stomach walls."

The simplest experimental case of a "motive" is to be found in the drug experiment. The ingested drug is not a "stimulus," in the usual sense. The stimulus is, as usual, that which the experimenter presents. The drug, when it becomes effective, is instead a veritable part of the reacting organism. But it may be in a very genuine sense nevertheless a stimulus of the specifying kind; it is a motive, a determining tendency, a purpose, and as such it does much to determine the type of reaction that will be made to the more conventional stimulus. But the drug, as a motive, exists in the blood stream, not in a supposed world of mental structures.

Simple observations on animals lower than man, or on human infants, show very clearly the presence of these two types of clue in the instigation of conduct. Thus Köhler reports of the chimpanzees under his observation that "a wish that is concerned with a certain spatial direction but cannot be fulfilled for a considerable time at last produces action in that direction without much regard to practical value." When an isolated and caged chimpanzee saw others eating, he made all sorts of movements, in an apparently random fashion—jumping, arm stretching, howling, throwing stones, fishing in the air with a straw, and the like. But that these movements were not made entirely at random is shown by the observation that they were all made *in the direction of* his more fortunate companions.

Each act had, of course, its own immediate stimulus. But over and above these particular instigating stimuli, there was the aim, bodily posture, or direction of attention, which prescribed the general field in which the coördinations would lie. This may be described as a "tendency toward the consummatory reaction," in the words of Woodworth, or as a "static movement system" in Washburn's terms. But the simple fact seems to be that the *sight of the feeding companions* is really the specifying stimulus, which through its arousal of a particular bodily set gives determination and direction to such particular acts as are from time to time instigated. In cases of the "delayed reaction," which have also been studied in the lower animals, some partial detail of this adjustment—the turn of the head, the elevation of the eyes, the flexion of a given set of muscles, or what not—symbolically serves the same purpose, or, more accurately, *constitutes* that purpose.

MOTIVATION OF THE NEUROSES

In the case of the psychoneuroses it is easy to see in what manner the specifying and the instigating clues conspire to constitute motive and stimulus. The soldier, overwhelmed at the front, remains easily startled by sounds, by the sight of sharp instruments, by verbal orders, by marching men, so long as he remains in the field hospital or the convalescent camp. This is, in part, because the background or context is made up mainly of stimuli that constitute a battle setting, a militant situation. These accessory stimuli themselves tend to maintain in constant readiness one set of responses rather than another. On this background of specification the specially determined stimulus remains effective in a prescribed direction only. Only those past contexts that are congruent with the present setting will be determinative. Thus "control" and "stimulus" both operate.

But if the patient is removed to the base hospital, to the reconstruction center properly organized, his condition is improved. The favorable therapeutic organization will be civilian rather than military. Or, still better, if he is discharged and returned to civilian life, even obstinate cases will recover on the voyage home. That is to say, as the general setting of stimuli becomes irrelevant to the battle scene, or as totally new scenes are encountered, these contextual details, each in its own redintegrative fashion, keep in activity, either tentative or overt, a different total set of reactions. Now the sound, the procession, the red color, are less likely to instigate their former and symptomatic consequents. Instead they redintegrate different responses, on the basis of other and nonmilitary historic contexts, congruent with the new backgrounds.

It is for this reason that a shift of scene, travel, a new occupation, a change of residence, and the like, constitute effective therapy for many neurotic cases. The patient who developes psychic anorexia after the death of her husband preserves the symptoms so long as she continues to live in the old apartment, sitting opposite his favorite chair, sorting his apparel and visiting his relatives—so long, that is, as her background is constituted by objects included in the original scene of sorrow. The commonly beneficial influence of changed environment testifies to the power of background stimuli in specifying which of various past contexts will now be effective.

Such changes of background, if honestly entered into, *constitute* changes in motivation. The motivation is not some weird psychic energy introduced into the situation, however. It is the constellation of focal stimuli and background stimuli that determines the consequent in a given instance. And in the case of both antecedents (specifying and instigating) actual details, more or less complete events, are present. The assertion that redintegration alone does not formulate the neurotic picture, and that motivation or drive must be added, must be met with the assurance that motivation is only more and further redintegration.

In the phenomena of hysteria we have an interesting, if bizarre, analogy with what is more ordinarily called thinking. Thus, thinking has often been defined as the solution of a problem, the handling of a difficulty. But in recent years hysteria is commonly defined in the same words. The usual accounts of "how we think" are as applicable to the genesis of a hysteric symptom as to the case of reflective thought. Both also are held to involve motivation.

This we conceive to be quite correct. Both hysteria and other forms of problem solution are redintegrative phenomena, that is to say, they are cases of mental procession. Both also require the coöperation of specifying and instigating clues or antecedents. In the neurosis the consequent is the particular symptom. In thought it is the act or conclusion. The difference between the two forms of procession is found in the degree of sagacity they display, in the momentary relevance of instigating and specifying details.

A further difference may wrongly appear to be present. It may be supposed, from our earlier illustrations, that the specifying details in cases of thinking are relatively restricted and few in number, but that in hysteria they comprise most of the general life setting. Both such suppositions will be incorrect, and will have been suggested by the particular examples to which we have limited ourselves. In both cases the specifying details may be numerous or few, inclusive or restricted, complete or symbolic. They may be found either in the fields of the special senses or in the proprioceptive and organic fields. They may be qualities or structures, terms or relations, objects, people or situations, sensations, images, postures, feelings, or vague organic states.

All that we here maintain is that both specifying and instigating clues are effective, and that both are natural and perceptible events, not inscrutable "instincts," "hormic" drives, supernatural sources of energy, nor even "pure thoughts." Every drive, in other words, is a mechanism in action. Every motive is a present stimulus. A purpose is but the specifying direction of events, consequent upon a given antecedent, within which field particular instigating details play their rôles. Even the interesting fact that the specifying details are more enduring is irrelevant from the point of view of the structural analysis of thinking.

SELECTION IN REASONING

Some account must be taken of the rejection or inhibition of particular consequents in what we call reasoning. The particular specifying influence is not omnipotent, and upon occasion it may fail. The instigating detail may arouse a consequent which lies quite outside the field favored by the determining tendency. Either some *other* determining tendency may get the upper hand, or sheer habit may outweigh the specifying stimulus. Then occurs a futile, or random, or even adverse consequent, which may be rejected. What is such rejection? May it not be a truer account, for example, to say that the specifying detail acts only as a selective agency, rather than as a determiner, selecting from "random" consequents those which are relevant to it? In such a case it should be described not as a *motive* but as a *criterion.*

Typical situations are easy to find. In the well-known "controlled association test" we have such an example. The instructions, let us suppose, are "Name the opposites." Some verbal, postural, or imaginal detail acts as the cue which "carries this meaning," or "constitutes the motive." But it is well known that in such a test *opposites* do not always come, or do not alone come. The sight or sound of the stimulus word (the instigating detail) may bring instead a "free associate," a synonym, or a word related only by virtue of speech habit, recency, and the like. Such a response is *false* and must be rejected *if the reasoning is sound.*

Let us first deal with the case in which it is rejected. It may be rejected at any of several stages of completeness. First, it may not even "occur," and this complete inhibition is of course a species of "rejection." It may occur in visual or auditory imagery, or as incipient speech, but never be articulated. This is also a "rejection." Or it may be uttered or written, and subsequently revoked or scratched out—another form of "rejection." Perhaps other modes of rejection could also be found.

Our earlier description seems, nevertheless, adequate. The motive has, to be sure, not *completely* specified the field within which the consequent shall lie. Yet, in so far as it *has* operated, its influence has been in this direction. It *has* favored a given field of consequents. Its favor is revealed, however, not by their immediate occurrence, but by the incapacitating of other consequents, which, on other grounds, were more highly favored from the beginning. What might seem to be rejection and selection in a field of random consequents is thus after all not a case of subsequent selection but one of previous specification with greater or less degree of effectual strength. Indeed, it was just this effectual strength which Ach tried to measure in his famous association experiments.

What is of special importance is that the specifying stimulus persist until an *adequate* consequent occur. This leads at once to the extreme case in which rejection does not actually take place on any level, or at least not until after tentative acceptance or trial. What is to be made of such instances?

Let us take the instructive case of a novice trying to draw the elevation of a house which he wishes to build. The motive is fairly definite, but the drawings, made one after the other, fail to *satisfy*. None have been inhibited. Each in turn was carefully executed and sketched with diligence. But in the end none of them may be adopted since they fail to satisfy the motive. What precisely is it to satisfy a motive? And if a motive operates by specifying a field of appropriate consequents, why does it not always produce an adequate product? What are we to do with those cases of reasoning in which consequent after consequent, suggestion after suggestion, occur, none of which may constitute a *solution?* Does not our account of the motive as specifying influence here break down?

By no means. For a vague motive will specify only a rather indefinite field. After all, the drawings *were* drawings of houses. And it was obvious that the motive was, although "fairly defined," yet sufficiently ambiguous to permit the occurrence of all these consequents. The products are inadequate only because the motive was too vague, or because it changed in the course of time (usually becoming more specific). Indeed, the changes in motive will usually be reflected in the series of drawings chronologically arranged.

To say that a motive operates by favoring a field of consequents by no means implies that every problem will be immediately solved. Solution may fail either because the motive is too vague for the practical situation or because the repertoire of consequents is too limited (ignorance or awkwardness). The motive and the criterion of adoption *may be* identical (as perhaps in naming opposites), but in many cases (as in drawing house plans) the motive is one thing and the criterion is some practical exigency. When a motive does operate, in other words, it operates by specification. When, instead of specification, we find only choice among random consequents, we are dealing not with a case of reasoning but with adventure. In practical life reasoning and adventure are often confused.

Much has been made, in the hygiene and pedagogy of thinking, of the *problem* as a feature in reasoning. What a problem is, however, is seldom confided. Now, problems do not exist outside of organisms. They are in fact organic states, states of unrest, of dissatisfaction, of irritation, of curiosity. An organic state is a natural event, and as such may constitute a "stimulus" or antecedent. Most *motives* are, at least originally, such organic states. They may later be represented by any kind of symbolic detail or fragment. But primarily a problem is an instability or an interest.

And what is the *satisfaction* of such a problem? In what sense does a stimulus require solution or satisfaction? In so far as a stimulus issues or *eventuates* in a reaction, the stimulus may be said to be transformed, consumed, resolved or, still better, merely succeeded. The stimulus to the knee jerk *issues in* that reflex. If the stimulus is prolonged or repeated, the reaction is often otherwise calculated to reduce or cancel the stimulus. Thus, the beam of light shining in the eye produces the pupillary contraction which tends to reduce or eliminate the stimulus. The irritation of a spot on the skin produces the scratch reflex, which is calculated to remove the stimulus.

Now, the motive is a stimulus that is not readily resolved, or exhausted, or removed. By the satisfaction of the motive we can only mean its disappearance. Typically, then, the motive is an organic state or tension, the cessation of which will constitute its satisfaction. Problem solving, therefore, consists in the neutralization of a stimulus, and this should make clear the general nature of a problem.

The urge, motive, drive, trend, or impulse, is not a mysterious psychic force. It is a natural event or stimulus, usually perhaps an intraorganic process which is not readily canceled. The solving of a problem, the satisfaction of a motive, the gratification of an impulse, all these are but indefinite ways of indicating the neutralization of such a persistent stimulus.

We may, however, distinguish between motive clues that are *immediate* and those that are symbolic. Thus pain, hunger, and various other like events are immediate stimuli. They do not, in general, function as *ideas* or symbols for other contexts. But words, images, gestures, attitudes, and certain affective events may play the symbolic rôle. In so far as the motive is symbolic, that is, substitutive or redintegrative, the procession of events is more likely to be called reasoning rather than voluntary action.

In some such fashion must we analyze the metaphors and personifications of the voluntaristic, dynamic, or conative psychology. The urge in problem solving is no different from the dynamism of the simplest reflex, and not essentially different from the force of hydraulics or mechanics. Events are, by their intrinsic nature, characterized by change and sequence. Mental events differ from others chiefly in their redintegrative character. The supposed selective rôle of the motive is a more or less figurative way of indicating the cessation of that motive.

Motives, moreover, are commonly more indefinite than their goals. That is to say, there are usually numerous ways of satisfying (removing) a particular motive. Thus the motive of a boy's activity may be the prickly heat of his skin. This motive may be removed by lying quiet, by gentle fanning, by immersion in the bathtub, by opening the windows, by going swimming, or by drinking cold beverages—one motive, many instruments or goals.

The great trouble with the usual psychology of motives is that it confuses the motive with its instrument. Thus it would attribute to the boy the long array of motives—to go swimming, to take a bath, to lie on the sofa, and so on. Since it thus calls different motives the array of instruments that satisfy a real motive, it encourages that strange cripple of theory, the doctrine of sublimation. For if one instrument is not available, another is adopted instead.

But one motive is not sublimated into another, although one instrument may be substituted for another. When such substitution is observed, instead of dilating on the mystery of sublimation, we should look behind both techniques for the actual persisting stimulus, which either technique may reasonably allay. There is every reason for believing that if our observations are sufficiently complete and precise, such a persisting stimulus will be shown always to be present. Organic strains, kinæsthetic complexes, visceral tensions, bodily postures, incipient vocal tendencies, fleeting and symbolic imagery, patent visual and auditory clues, vague affective experiences, thermal and tactile irritations, and the like, indicate the modes in which such persisting stimuli or motives will often be found.

It is futile to demand an *explanation* of the persistence of motives. Any event, by nature persistent, of the intraorganic type, may by virtue of that fact function as a motive. *Why* some events are persistent, and are thus available as motives, is a matter of natural history, just as is the question why one type of event is rare, another frequent.

REASONING IS A SEQUENCE OF NATURAL EVENTS

Our chief concern at this point is the insistence that the motive, purpose, aim, or problem is itself not an occult force, but simply a natural event, relatively persistent, functioning redintegratively for a previous complexity, bringing to readiness (tentative, symbolic, or inhibited occurrence) a large field of consequents. The readiness of this field thus prescribes or specifies the direction of overt sequences instigated by current and transitory stimuli.

The motive in the true sense, that is, the motive power or the propulsion, is given in the active, living character of the world—sequences do occur, time passes, events transpire. It is the task of science to record, formulate, and correlate these occurrences. Reasoning is one of these types of sequence. We have sought to describe its generic feature in terms of the redintegrative formula to which it owes its mental character. Its specific, as contrasted with its generic, features, we find in the redintegrative coöperation of two cues—the enduring or specifying and the transitory or instigating. It has seemed possible to do this without the invocation of any supernatural structures, of any occult potencies, of any peculiar faculties, of any pure thought qualities. Reasoning and motivation thus find their place in the psychophysical continuum of natural events as special types of sequence, as modes or patterns of correlation.

CHAPTER XVI

THE DEFINITION OF JUDGMENT

> I am in little pain whether anybody chooses to follow the name I give them or not, provided he allows that what I dispose under different heads are in reality different things in nature.
>
> EDMUND BURKE

COMPLEXITY OF THE PROBLEM

Attempts to define the nature of judgment, and to give it a definite place in the scheme of psychology or of logic, are determined in part by the attitude taken toward certain more fundamental or elementary questions or concepts. Thus, if judgment be described as the affirmation of a relation between two members of a pair of objects or terms, this at once involves a certain meaning of the ideas used in the definition. What is an affirmation as distinguished from a mere formulation or a question? What is the "belief" that attaches to the judgment process? What is the nature of a relation which can subsist only in the presence of two or more members, or is this in fact the case? What, indeed, are the members or items between which relations may be established?

What status in the world do these various experiences have? Which of them, if any, are objects given in a substantial world, and which of them, if any, represent acts only, on the part of the subject in whose experience the objects are encountered? Are relations really "perceived"? Do they have "objective reality"? Are they in any way classifiable along with weights, colors, and tones? Are they also "contents of consciousness," or are they only "relating acts"? Can they be attended to? Do they have attributes corresponding to the quality, intensity, and duration of "sensations"? Are they, in fact, discovered, or are they only made, invented?

Some account must be taken of these questions before we determine upon a final characterization of judgment. In certain of the preceding chapters, especially that dealing with the psychophysical continuum and with meaning, we have indicated what direction our own answers must take.

INTROSPECTIVE DIFFICULTIES

It may be objected that a doctrine of judgment need not involve any presuppositions; that the nature of judgment may be directly ascertained through introspection. The subject may be required to judge, and thereupon to give us an account of what he found in consciousness as he judged. But there are several important obstacles to any such procedure. In the first place, it is quite impossible to give, in any reasonable time, a complete report of all that happens in consciousness even during a period of a few seconds. All that the observer can do is to select from the total experience those events which seem to him likely to have some bearing on the process in which the experimenter is interested, report these, and ignore the remainder.

The introspective accounts of consciousness given in the literature of thinking strike the reader as usually naïve and unsophisticated in this respect, so frankly do they represent only the selection of certain events in the light of preconceived theories and expectations. They almost never, for example, report the outdoor noises, the sight of the apparatus, the sounds of breathing, the movements of the diaphragm, the purposeless activity of the body, the ceaseless movements of the toes and fingers and tongue. It is clear that the reports are of events coming clearly to attention, rather than of all events transpiring. It is the presumably relevant details, rather than the totality of events that is reported.

Either, then, the subject reports under the influence of a certain selective attention, or else the writer chooses for publication only those items of the report which he considers relevant to the process in hand. Certainly under neither circumstance can a true notion be conveyed of the characteristics of the process that occurred, especially in view of the vicarious and symbolic functions of terms and of relations as we have found them in our study of drowsiness, dreaming and formal thinking.

But a further objection is even more important from the point of view of experimental technique. The suggestion was: Let the subject be required to judge, and thereupon to report the course of consciousness. But this obviously implies that we already know what judging is. Otherwise, how could we require him to judge, and how be sure that he did so? How can we be certain that what he is reporting is really the judgment process?

Thus in one of the earliest studies of judgment by the introspective method, that of Marbe, the investigator, in his own words, sought to learn "what experiences must supervene upon a conscious process in order to raise it to the rank of a judgment. So . . . we place the observer under conditions in which he may experience the most diverse kinds of mental process in their passage to judgments, and then ask him to report what concomitant experiences supervened upon those processes, and endowed them with the character of judgment." Provisionally, a judgment was defined as "a conscious process to which the predicate right or wrong may be significantly applied."

Obviously the introspective account will relate only to processes coming under this definition (if instructions are followed) since such processes are the only ones directly set up by the experimental conditions. And obviously Marbe's preliminary definition is unsatisfactory, for it would cover also those processes known simply as memory, acts of naming, and the like; and it would exclude the verdicts of æsthetics and of value, which by rather common consent are also designated judgments.

MARBE'S DEFINITION

It is clear enough that when I say that Weight *A*, in the size-weight illusion blocks, is heavier than Weight *B*, this opinion either accords or not with the testimony of the scale beam. When I suggest that Columbus discovered America, this proposition is either confirmed or refuted by authentic records of history. But suppose that I am asked to note which of the two weights *seems* heavier. Is not this noting of their *apparent* weight a judgment? But how is its correctness to be determined, or with what other fact, meaning, or object is the act to be compared as right or wrong? Only if I go further than the noting, and also *indicate* one of the weights by word or gesture, can it be said that there is an act (my indicating) which does or does not accord with another fact (the impression actually made on me).

My hostess asks whether she shall put cream or lemon in my tea, whether I like her new hat, and which of two colors is more becoming to her. No matter how I answer these questions, the replies, although they might not *constitute,* would at least *express* my judgment. But with what objects are they to be compared as right or wrong? My hostess did not inquire whether she should use lemon or cream merely in order to see whether I could *guess* what she was really going to do. Nor does my like or dislike of her hat fulfill any intention on my part to accord with another fact or meaning.

There are, then, experiences which are commonly called judgments that do not fit Marbe's formula. On the other hand, Messer has pointed out, and Titchener has reaffirmed, that the formula fits many experiences which we are unaccustomed to consider judicial, such as the correct reproduction of nonsense syllables in a memory experiment, and the execution of movements by a gymnasium class in response to the verbal instructions of their leader.

It should also be noted that Marbe (as well as others after him) was not looking for the intrinsic make-up or pattern of judgments. Instead he was looking for "accompanying contents," "accessory experiences," "attendant phenomena," "supervening events," whose presence should be a constant criterion of judgment. In just this way would a gardener proceed who sought to distinguish watermelons from canteloupes by discovering types of insect pests, invariably and differentially associated with each. The obvious protest is, Why be so concerned with *Begleiterscheinungen?* Why not examine the melons themselves? What we require, first of all, is a satisfactory phenomenological indication of those events, experiences, or processes which the term judgment is to denote. Such a definition is to be psychological rather than logical, and is to take due account of the status of the elementary features or processes which it involves. Such an account is what we here seek to present.

No attempt will be made here to evaluate the accounts of the nature of judgment offered by Messer, Watt, Bühler, Selz, Lindworsky, Brunswig, and others, on the basis of the method of "systematic introspection," except to indicate the chief grounds of their inadequacy. They do not afford us a phenomenological indication. To define the judgment as a process determined in its course and outcome by an antecedent *Aufgabe* is to include entirely too many disparate things under a single heading, with no criteria for their differentiation. To introduce an array of such concepts as *Wissen, Bewusstheit, Gedanken,* and *Wissensaktualizierung* is undoubtedly to recognize an important type of phenomenal event. But as these terms have commonly been employed they emphasize a *content* rather than an active procession, and they imply the traditional cleavages of mental and physical, stimulus and experience, which we have found to be the chief impediments to psychological progress.

THE CRITERIA OF JUDGMENT

Of the various problems connected with the topic of judgment, we consider first, then, only that of the differentia or criteria of judgment as a process, including the relation of judgment to other mental processes or events. First of all should be considered what we may call the *expression* of the judgment. By this we mean the designation of its content by some identifying name or sign which will serve for purposes of communication and record. Classically the expression of the judgment is the *proposition.* This is a language indication, following the grammatical laws and subject to all the habits and traditions of speech. Conspicuous among these are the requirements of subject, predicate, and copula.

Much discussion has been occasioned by these linguistic elements, under the impression that they reflect essential features of the mental experience, and usually without due regard to the accidental and practical factors determining the evolution of speech. But the variety of ways in which a judgment may be expressed should constitute sufficient warning against the confusion of psychology with philology. The judgment, as Marbe realized, may be indicated or communicated by any of a great number of devices—by speech, by gesture, by practical adjustment, by sequence of imagery, by change in the direction of thought, by consequent feeling or attitude. Whatever be the nature of the indication, however, it is no essential part of the judgment except as it be conceived as the final event that brings the judgment process to a close. The proposition is not a judgment, but the conclusion of one.

Adopting the redintegrative account of meaning which we have suggested, we may point out again that the processes involved in a significant or mental situation comprise, in their entirety, what we may call thinking. Four features of such a situation have been indicated, which we have named (*a*) the significant, (*b*) the signified, (*c*) the signifying, and (*d*) the significance. We have shown that the classical theories of meaning each fastened upon one of these features, the exploitation or overemphasis of which determines the content of the theory.

By the "significant" we mean the instigating event, the sign, cue, stimulus, or antecedent, corresponding to what logic terms the "subject" of the proposition. By the "signified" we mean the past total context, of which this cue or a closely similar fragment was a detail, and which corresponds to the "middle term" of logic. By virtue of the redintegrative sequence, the present "significant" functions in a manner which, for given purposes, is indiscernible from the way in which the total antecedent event would function if repeated. The "signifying" is the fact of this functioning or instigation—the arousal of response, adjustment, image, attitude, feeling, vocalization, or other event, which indicates or expresses or constitutes the direction of function. It corresponds to the "copula" of logic and to the "association" of psychology. The "significance" is this final event or expression, conceived as the consequent of the antecedent cue, in the light of its past context, and corresponds to the logical "predicate."

It is clear that this account of meaning is pertinent to the current definitions and descriptions of "judgment" as found in contemporary textbooks of psychology. In fact, many of those descriptions may be subsumed under the simple definition of Pillsbury, according to which judgment is "the ascription of meaning to the given." We may with profit consider some of these descriptions briefly, in the light of the redintegrative formula just reviewed.

CONTEMPORARY DEFINITIONS REINTERPRETED

Consider Binet's definition of judgment: "Three images which succeed each other, the first evoking the second by resemblance, and the second suggesting the third by contiguity, . . . an association of images, for the time being indissoluble." Substitute for "image" our term "event," and realize that resemblance is partial identity. The "first event" is the cue, the second is the past total, the third is the final event—the "significant," the "signified," and the "significance" of the redintegrative account. And we need not resort to the trick of the invisible image, as did Binet when he found that the presumed "second image" could not really be observed. Instead we discover a past episode which by its very nature cannot be observed, nor is it present.

Warren defines judgment as "the combination of two meanings, . . . the fusion of two thoughts (of which) some of their meaning elements are similar." Substitute for the equivocal "thoughts" the "events" of our own account. The reaction to or expression of the fusion of two thoughts thus becomes the redintegrated adjustment or consequent due to the substitute functioning of a "cue" event for a more comprehensive total context involving similar elements. What is required, in the main, is to escape from the dualistic conception of "images" or "thoughts" as peculiarly "mental," and to substitute for this conception that of natural processes or events. Judgment thus becomes that total set of processes in which we have discerned the four features involved in meaning.

Hoeffding's account, again, stresses a certain aspect of this process. "Two or more concepts are combined, the one being shown to be a closer determination of the other, to present a part, a side, or an effect of what is contained in the other." What is this but the effective functioning of a cue in the light of its determination by a previous total event? Hoeffding's insistence that the judgment is an *analysis* of the "connected whole" apparently refers to the verbal proposition, which ordinarily *indicates* or *names* these various features, and in that sense may be called an analysis.

In just this way, also, we may interpret Wundt's statement that "if we call the aggregate idea which is subjected to such a relating analysis a *thought,* then a *judgment* is a division of this thought into its components, and a *concept* is the product of such a division." But we should prefer to avoid the mentalistic implications of these names, and take them as referring to parts of a natural series of phenomena, a sequence of events.

Especially interesting, from this point of view, becomes Titchener's conviction that "judgment belongs to the same psychological genus as voluntary action." He adds to Wundt's "analysis of an aggregate idea" the "influence of a foregone suggestion." This amendment is important, for it points to the fact that not every past context in which a present detail has played a part need be effective in the present sequence. This introduces the concept of "motivation" or "problem," which we have also attempted, in the chapter on Reasoning, to explain in redintegrative terms. Titchener's demonstration that "the suggestion, however, may be present not only as aggregate idea, but also as verbal imagery or as attitude, and it need not be consciously present at all, but may be effective as a cortical set" is also important. It shows us clearly that it is in the nature and sequence of events, rather than in the characteristics of a peculiar field of consciousness that the phenomena of thinking are to be traced, and that a longitudinal view rather than a cross section of experience is required for an adequate account of thought.

It is obvious that Pillsbury's account of judgment as the process of "ascribing meaning to the given" hinges upon the account of the nature of meaning. The redintegrative account which we have suggested, is, as a matter of fact, very aptly summed up in Pillsbury's words. The *given* is the clue detail. The *meaning* is the efficacy of the historic context. The *ascription* is the effective instigation of a consequent, whether this be image, act, or verbal indication. But we should, as will later be indicated, reserve the term "judgment" for a less inclusive situation, and employ the term "thinking" for this general meaningful process.

Consider further the account of Dunlap. "In judgment one of the subsidiary concepts, with a definite system of relations linking it to the general concept, simply becomes more vivid." Aside from the mentalistic terminology, this is almost a paraphrase of the redintegrative formula. We may be sure from the context that the mentalistic implication of such terms as " concept" and "vivid" is foreign to Dunlap's intention, and that we may substitute "event" for "concept," and "effective" for "vivid," without doing violence to the essential purport of the definition.

Calkins' statement is that "judgment, structurally regarded, is a complex of elements of consciousness, characterized by the relational experience of 'wholeness.' The related object of judgment may be of any type: external thing, other self, inner experience (my hat, my friend, my theory)—that is, I may regard any one of the three as a complex whole and may emphasize by my attention a character included as a part of this whole or else excluded from it." As we have seen in our own analysis, the essential thing about the thinking process is the part-whole efficacy of a detail. Calkins' emphasis of the part-whole relation, as that of Wundt and Dunlap also, fits perfectly into this account, if we substitute action or sequence for attention, or even consider attention in the light of an event or an adjustment.

In considering the psychology of meaning, we saw that even the accounts of that process offered by the logical idealists and by the doctrine of intentionalism fit readily into the redintegrative formula. We have now to suggest that the idealistic accounts of the nature of judgment fit equally well into this paradigm. Thus Bosanquet concludes: "Judgment, as we have seen, is primarily the intellectual act which extends a given perception by attaching the content of an idea to the fact presented in the perception. . . . The 'idea' of which I am speaking is, of course, not the particular existence or single occurrence of a psychical image; it is the general signification for the sake of which we use the psychical image."

It is not difficult to translate into the language of our simple psychophysical continuum of events the terminology of the idealistic logic, with its weird machinery of "reality," "psychic particulars," and the intermediate realm of "floating adjectives" and "universals." One who becomes familiar with both languages readily discovers that they are describing the same facts. Thus we may attempt to paraphrase Bosanquet's definition of judgment as follows: Thinking ("judgment") is primarily a series of events ("intellectual act") in which a detail event ("a given perception") functions for an antecedent total situation ("is extended by attaching a general signification"). Once the items involved have been simply characterized in other words, the redintegrative formula satisfies the demands of even the idealistic logic. The differences are chiefly those of terminology.

IDEALISTS AND OBJECTIVISTS

It seems unnecessary to give any detailed account of the view of Von Bechterew and the objective psychologists in general, since the doctrine of "reflexology," in the case of the thought processes, is but a special case of the application of the redintegrative formula (aside from the dualistic implications of objectivism). For the objectivists, thinking is merely a series of overt or incipient speech reactions of the associative type. The expression of a judgment is the discharge of an overt or inhibited or incipient "word reflex." With a given objective situation, say, the relation and sequence of two weights, under special instructions, comes to be attached the vocalization "heavier." The calling out of this vocalization is all that is involved in judgment once the association has been established. So we name the external relations, just as we name the simpler stimuli, or react to them in selective fashion.

Some such account also will probably be given by the behaviorists in general, when the time comes for them to go beyond the curves of learning, the discrimination of wave lengths, and the salivary secretions. We have already had occasion to emphasize that the "conditioned reaction" here relied on represents only a special case of redintegrative sequence. Thus are such strange bedfellows as the behaviorists and the idealistic logicians brought together by the redintegrative formula. We can scarcely expect either to rest easily.

JUDGMENT AND BELIEF

Up to this point the definitions of judgment considered have really been seen to be descriptions of all thinking. This similarity is one reason why many have been disposed to reject the word "judgment" as relating to any special psychological experience. There is, however, another group of definitions of judgment which seek to differentiate it from other processes. Judgment is held to consist not merely in the *awareness* of an aggregate-idea and the vividness or effectiveness of some of its parts, nor merely in the *thought of* the relation between two items; the essential factor therein is conceived to be the attitude of *belief*—the *acceptance* or *assertion* of the relation as actually existing.

Thus, Thorndike, writing of judgments, says: "They are feelings that a certain state of affairs is or is not the case, that a certain relationship does or does not exist between certain things. They are feelings which affirm or deny something of something."

More explicit in this recognition of judgment as a special "Yes-No" consciousness, identical with *belief,* are Brentano and Stout. We may quote from Stout, who bases his account essentially on Brentano's earlier one. Distinguishing the Cognitive from the Conative "aspects of our nature," the Cognitive is seen to have three "modes of consciousness"—sentience, simple apprehension, and judgment or belief. "Judgment is the Yes-No consciousness. Under it I include every mode and degree of affirmation and denial—everything in the nature of an acknowledgment explicit or implicit of objective existence. I use the term Belief as a convenient variant for Judgment."

Speaking generally, we have indicated but two groups of doctrines, definitory of judgment. The first group falls readily under the redintegrative formula, as descriptions of *thinking in general,* in which the essential feature is the phenomenon of meaning. The second group of doctrines seeks to differentiate judgment from other processes on the basis of confidence or belief. We have now to suggest such conclusions and reconciliations as seem to lead to a more satisfactory use of the term judgment, and of certain other terms commonly associated with it.

A TENTATIVE DEFINITION

In a preceding chapter were described four "fundamental types of report," characterized by varying degrees of confidence. It was there suggested that these types of report correspond approximately to the popular uses of several psychological categories. In connection with this account it was suggested that these uses of the psychological terms were not entirely to be recommended without more careful definition.

Distinguishing four degrees of confidence, on the basis of empirical data and experimental results, it was proposed that the term judgment be employed to indicate those reports which are attended by the third degree of confidence. The following table will summarize and review the results of the earlier discussion. It gives in the first column the various degrees of confidence; in the second, the percentages of correctness; in the third the terms commonly used for such reports.

Basis for Tentative Definitions

Degree of Confidence	Percentage of Correctness	Psychological Category
A	95	Perception
B	80	Judgment
C	70	Belief
D	60	Feeling
E	50	Guessing

We now suggest that this distinction on the basis of "degree of confidence" affords a definition of judgment that takes careful advantage of such merit as is possessed by the second general group of doctrines, illustrated in our account by Thorndike, Brentano, and Stout. We must add to those doctrines the observation that belief is not an all-or-none experience, but displays degrees and gradations. Instead of identifying judgment and belief, then, we should prefer to adopt them as the names of processes which proceed with different degrees of assurance.

There is thus suggested a phenomenological definition of judgment—a designation of that conscious situation or process which we might well agree to call by that name. It is characterized, in general, by the criterion suggested by Woodworth: It is an answer to a question. In this sense there is no peculiar conscious quality that belongs to it. But we have indicated a further limitation, of the specific rather than of the generic kind. Expressions of feeling, belief, and perception are also, in a sense, answers to questions, solutions of problems, resolutions of doubts. Hence the proposal that the degree of confidence constitute the peculiar conscious mark that distinguishes these types of answer one from another, has a certain justification.

In leading up to this definition it was necessary to eliminate the sharp distinction between the mental and the physical orders and to give relations a status of real existence, as direct objects of report. This was true not only of relations of comparison, but of all relations whatsoever, as well as of the relational complexes and structures which comprise form, pattern, and arrangement. On this basis the sequence, the intervals, the harmonies, and the melodic patterns are directly encountered in experience, just as are the tones and noises between which these relations subsist.

However, there is no reason to suppose that confidence displays sharply marked stages or degrees. Instead, we must suppose, in the light of experimental evidence, that it is a continuous function of the difficulty of the situation, the completeness of the data, the accuracy of the reaction, and, perhaps, of the mode of report. The four stages we have here designated are, therefore, more or less arbitrary, although they are surely more faithful to the facts than is the sharp distinction of affirmation from denial. The whole topic of confidence and belief merits more careful examination than we can give it at this point. For the present we must conclude that the second group of doctrines, even with our attempted modifications, fail to give precise and adequate differentia of judgment.

We may turn, then, to the first group of definitions, which in attempting to define judgment described instead the characteristics of all thinking, namely, redintegrative sequence. If we call the "consequent event" of our more formal discussion the "response," it may be pointed out that a response may be evoked in various ways, a report based on various grounds. It may be a response to an original total situation, or it may be evoked by a partial detail or secondary cue. This cue is thus a vicarious stimulus, a substitute or symbol, and may, as such, be an event of any sort—quality, pattern, relation, or process. And again, a detail, as a word, associated with this vicarious stimulus, may in its turn act as a vicarious substitute for the original symbol.

PERCEPTION, JUDGMENT, INFERENCE, AND BELIEF

There is, consequently, another sense in which the terms "judgment" and "perception" may conveniently be distinguished and both of these thereby related to another process which may be known as "inference." This distinction is particularly applicable to the process of comparison and the verdicts thereby achieved. Judgment has been defined, as we have seen, as the affirmation of a relation. But this is a generic, not a specific definition. There are several ways of knowing a relation—at least three distinguishable ways—and it seems useful to designate only one of them by the name "judgment." Experimental studies afford many examples, in almost every field, of these various procedures.

As has already been pointed out, relations are found in the world, not manufactured by the apperceptive machinery. But relations may be discovered in more than one way. The simplest way is that of directly encountering them and knowing them for what they are. Thus I hear two tones in succession, and directly perceive their sequence. The sequence is or may be quite obvious, and quite as directly encountered as are the tones themselves.

What I find will depend in part on what I am looking for. Thus, if I am looking for pitch relations instead of temporal ones, the latter may go quite unreported. Or if I am on the outlook for number, neither pitch nor sequence may be noted. But all of them are there, just as surely as the tones are there, and in the same sense.

Indeed, the first thing to be apprehended may be the relation for which I am looking. Or I may get the relation while confronted by but one of the members of the pair, as when I note that a change has occurred without knowing the objects between which the relation of difference subsists. In the same way, I am at once aware of the similarity of two colors, of the equality of two weights, of the relative beauty of two objects, or the desirability of two alternatives. And in all these cases the relation may be clear and distinct, its certainty may be great, and its expression explicit. Indeed these circumstances are usually the case in this mode of apprehending relations.

But this is not judgment, in any meaningful sense. If words are to mean anything at all, this is perception. It is the direct presence of an experience in consciousness, in its own character. The fact that the experience is relational, rather than olfactory or kinæsthetic, makes no difference in the process of reporting or apprehending it. If I name the relation, I name it in the same way that I name any other object or event. But naming is only a reaction to an object, just as kicking it or picking it up might be. It is a perceptual reaction in this case, and its aspect of report is what makes the situation a "conscious" one.

However, there is still a second mode of reporting relations, which, as a process, has peculiarities of its own—a process which has often been described and sometimes called "mediate perception." I may, in comparing two movements, affirm one to be longer than the other, not because of a direct apprehension of space relations, but instead because one movement required a longer time for its execution. I may affirm that to-day's sky is clearer than yesterday's because, on observing the shadows on the ground, I find them more distinct. I may compare the pitch of two tones not by apprehending this relation itself, but by comparing the laryngeal movements involved in reproducing them. Similarly I may estimate one garment to be of better quality than another, not by a direct comparison of texture, but by inspection of the price tags, or the names of the manufacturers.

In these cases the primary relation is affirmed, and usually with certainty and accuracy only less in degree than that which attends direct perception. But this is not on the basis of direct apprehension. In each case the knowledge of the relation is mediated. By comparing *C* and *D,* in which I directly perceive a relation of one type, I know the relation of *A* and *B*, which may be of quite another type. Even the quantitative or qualitative categories may be reversed. Thus a *space* relation is affirmed on the basis of a perceived *time* relation. And on the basis of a *shorter* interval I may even affirm a *longer* movement. This mediated type of relational report may in a significant sense be called judgment. Such a usage accords with a common meaning given to this term in daily life. Thus the eyewitness directly perceives the criminal's guilt. But the magistrate or jury can only judge it, on the basis of a comparative study of the testimony. When direct observation fails we rely on our judgment, that is, on our apprehension and interpretation of secondary relations.

In all these cases of judgment a real comparison of objects has occurred, but the objects directly compared are not the objects that are judged. This difference of objects is what distinguishes judgment from perception, and the presence of comparison is what distinguishes judgment from another process of report which may be called inference.

In what we shall call "inference" a relation is known through a mediating process also, but not through a comparison. Thus I may assert that one weight is lighter than another because when I lifted it it flew suddenly up into the air, or because I see the other weight tip the scale beam. I infer one time interval to be longer than another because I found myself to be restless and impatient long before it ended. I conclude that one automobile is better than another of the same make because it is used as a demonstration car, or that one man is wealthier or less ambitious than another because he plays golf or chess. I infer that last winter was more severe than this because I remember that the street cars were stopped for several weeks. Here the comparisons are mediated by a process which is not itself a comparison, by a bit of extrinsic knowledge that is taken simply as a sign, symbol, or index of a certain relational status of the primary objects of thought.

Here, then, are three processes—perception, judgment, and inference. They are distinguished not by the presence or absence of characteristic introspective content, so far, at least, as we have described them, but rather by the technique of their operation and especially by the nature of the data on which they are based. They are, to be sure, not sharply separated in their occurrence. Thus the so-called perception of distance probably involves all three processes—direct perception of linear magnitudes, judgment on the basis of eye movement and accommodation strain, and inference on the basis of intervening objects, rate of motion, haziness, and color. Moreover, a concrete performance, such as that of judging distance, perhaps changes in character or process with age, experience, emergency, or circumstance.

In addition to these three familiar processes there is a fourth way of apprehending or reporting relations. This is the process in which we accept their presence on the testimony of another person. My instructor informs me that, with a given luminosity, printed matter is more legible in red light than in blue; or that he that ruleth his spirit is greater than he that taketh a city; or that auditory reaction time is shorter than visual. I have faith in the honesty of the instructor and hence I *believe* in the relations he asserts, and may report them on the basis of this belief.

This is a more remote apprehension of relations than is any of the three other processes. It is not strictly an apprehension at all, perhaps. Still, I do act upon these relations and allow them to control my deliberation and my conduct. They may in some cases be supported by vague and unanalyzed inclinations or by *feelings* of my own. In a sense they are my beliefs, rather than my inferences, or my judgments or my perceptions. In the absence of innate ideas and of inspired revelation, these four processes seem to constitute our only modes of apprehension.

These definitions of inference, judgment, and perception parallel in a fairly definite way the distinctions we have previously made (on the basis of degree of confidence) between perception, judgment, and belief. Inference is ordinarily less certain than judgment, and judgment less assured than perception. All signs may occasionally fail, and indirect comparisons sometimes go astray, but perception is always what it pretends to be, if its objects are correctly indicated.

THE CATEGORIES ILLUSTRATED

We have thus sought to give the term judgment a definite and a specific connotation. It is not merely a name for the process of expressing or indicating a verdict, nor is it merely a particular feeling or a peculiar Yes-No consciousness. Nor is it an analysis of an obscure aggregate-idea, nor a synthesis of two images, nor an articulation reflex. It is instead a *process,* a characteristic *procession* of events, wherein there is involved the indication of one relation, not through its direct perception and report or naming but on the ground of the perception of a second relation instead. The immediate recognition of the relation of two weights is perception. The step from comparison of motor reactions, or lifting movements, or time relations, to the report of weight relations, represents judgment. Report of weight relations based on a feeling of surprise or of fatigue, with no direct comparison involved, represents a case of inference.

Consider the awareness of change in any state of affairs—change in the pitch of a tone, the color of the sky, the temperature of the room. If it is directly apprehended as a transition, this is the perception of change.

But if one achieves the knowledge by comparing cross sections of the facts, taken at successive intervals of time, and thereby concludes that the situation has changed, this is judgment. Or it is also judgment if, by observing the increasing brightness of the sun, or the increased or decreased number of people walking in the park, I conclude that the sky is changing in color or that the outdoor temperature is changing. I have compared, and by comparing have achieved knowledge of a relation. But the compared objects were not those between which the affirmed relation subsists. Judgment, that is to say, always relies on secondary or accessory criteria, but these are themselves relations.

The knowledge of time affords a neat instance of all three modes of reporting relations. Thus, very short intervals may perhaps be directly compared or estimated. Somewhat longer intervals are judged on the basis of secondary criteria, such as the phase of a motor process, sensations of strain, feelings of impatience, and the like. Still longer intervals or periods are inferred on the basis of position of the hands of a clock, or on the basis of other remote and nontemporal and nonrelational premises.

How now may we know, in a given case, whether the report of a relation is immediate and perceptual, indirect and judicial, derived and inferential? There seem to be at least two ways of knowing. One way is through the direct observation of ourselves or through the testimony of others concerning their self-observations. The other way is by interference with the presumed base of operation, in the endeavor to learn whether such interference upsets the process of knowing, or the quickness, certainty, or correctness of the verdict. Perhaps a third method is also to be indicated, that of learning whether the verdicts agree more closely with the true relations of the objects judged, or with the relations of the processes indirectly relied on. In some connections we may have occasion to use all three of these methods. All of them are subject to certain sources of error, and perhaps certainty can be arrived at only through the combination of all methods.

METHODS OF INQUIRY

Any one of these methods, used alone, leaves much to be desired. Thus the first method, that of direct observation, is more fruitful in negative than in positive results; it is easier to focus upon a conjectured process and report its absence than it is to describe the complete enterprise. Thus in Bentley's study of the *Memory Image and Its Qualitative Fidelity,* he sought, through the method of direct report, to determine whether the image is necessary, as a factor in a comparison, in reporting the relations of greys and colors. He concludes that images are not necessary for such report, and writes as follows:

> It frequently occurred with all observers that a judgment was given with no hint of a comparison of two stimuli. Even where no active recollection was possible, no vestige of an image surviving the interval, a decision came like a flash, with the giving of the second stimulus. By much questioning we found that the observer's confidence in the correctness of his decision was quite strong in such cases, but usually he was entirely at sea when asked how he made the judgment. The expression of sameness or difference seemed on the tongue in the instant, without the vaguest allusion to anything past or absent. . . . The work seems all to have been done for consciousness. . . . A certain stimulus, if presented after another, sets the organism in a particular way.

Such negative results as these, in later experiments by the students of the thought processes, have led to the assumption of pure thought elements of various kinds, to take the place of the more conventional elements which were sought for but not found. But it should be pointed out that the fact that observers may be "quite at sea" in their efforts to describe a process is scarcely equivalent to the positive description of a new and unique process.

The second method, that of interference with the presumed base of operation, may also be readily illustrated from the classical experiments on comparison. Thus Lehmann, in his studies of *Recognition,* made certain assumptions concerning the mechanism of report. He writes: "If one has a sensation *A* and after an interval of time is given another sensation *X,* and is required to state whether this *X* is the same as *A* or different, such a report is impossible unless there is a memory image of *A* with which the present sensation may be compared."

He then points out that, if the image is really so used, certain consequences should follow. Especially, the process of report should be made more difficult and less accurate by interfering with the use of this image in certain ways, such as increasing the number of sensations among which a single one is to be recognized, decreasing the magnitude of the difference, lengthening the interval between the original experience and the moment of comparison, forcing the comparison before practice has enabled the individual to form vivid images of the standard, and choosing as subjects individuals with weak imagery powers.

He then performed these variations, and found, as he predicted, that the process of report was impaired and rendered less accurate. But unfortunately this is only affirming the consequent, and by no means proves that Lehmann's original assumption as to the use of the image is correct. Affirming the consequent is a dangerous experimental fallacy, which, however, characterizes many of the earlier studies of the process of comparison and report.

Another early example of the use of the method of interference is in the case of Angell's study of the *Discrimination of Clangs.* This author sought to test the memory image theory of comparison by introducing various distractions which might be supposed to interfere with the preservation of the image and thus to impair the process of report. The distractions included adding, counting metronome beats, reading, listening to read material, and working with other noises, in the interval between the two clangs to be compared.

The most striking result of their experiments, on this point, was the failure of the distractions to produce any considerable loss of accuracy in report. They conclude: "The main conclusion to be drawn from the distraction experiments is that judgments of tone discriminations can take place, and in the majority of our experiments did take place, without conscious comparison between the present sensation and the memory image of a past sensation."

Inasmuch as they called for no direct observations, but relied solely on the method of interference, this conclusion is, of course, an inference. It assumes that their "distractions" did actually incapacitate the memory image, but that this incapacity had nothing to do with the report. Such an assumption is perhaps unwarranted, at least until it has been clearly proven that such distractions actually do incapacitate the memory image and unfit it for use.

This method of interference is an interesting one, however, and the present purpose is only to point out some of the difficulties of analysis that are encountered in the interpretation of its results.

We may illustrate these three methods of inquiring into the criteria of report by referring to the investigations of the basis of our knowledge of the extent of our own movements. With reasonable accuracy, two hand movements may be made so that the stretches traversed by a given point on the moving member may be of equal extent. Or, of two such movements made, we are able to report that one was longer than the other. What are the criteria used in making such reports, and are the reports such as we would call direct perceptions, or are they judgments or perhaps inferences? How do we know the extent of our own movements? Since the question as thus put is a very complex one, we may simplify it by asking merely whether perhaps reports of extent are not always judgments, based on the comparison of the durations of the respective movements.

By the method of direct observation we note whether our reports of extent actually do involve preliminary comparison of the durations occupied by the movements. Observation informs us that this is by no means always the case, although it may tend to become so in so far as the movements become automatic. Subjects may make fairly correct reports of extent without the comparison of durations ever having occurred to them as a possible criterion.

By the second method, we may take duration as a presumed criterion, and proceed to interfere with its use. Thus we compel one movement to be made at one rate, the other at another rate. Such interference we find by no means to incapacitate the subject for the comparison of the extent of movements, or for the reproduction of movements equal to a given standard of extent, although the error of report becomes somewhat greater under these circumstances.

According to the third method we ask for reports of extent of movement. Meanwhile we record also the durations of the movements that are being reported. We may now compare the verdicts on the one hand with the actual relations of extent, and on the other hand with the incidental relations of duration. If the verdicts agree more closely with the relations of the durations than with those of the extents, we may surmise that it was really the temporal relations that determined the direction of the reports. Or we may reverse the situation by requiring our subject to report upon the durations deliberately. We may then compare his verdicts with the actual durations and with the incidental extents. Furthermore, we may compare the express reports of duration with the express reports of extent. If one type of report is derived from the other, we shall not expect to find the derived reports more accurate than the primary verdicts themselves.

In a previous study of *The Inaccuracy of Movement* such an analysis was reported. "Summing up the results of the experiment . . . we may say that although the argument is not overwhelming, the balance of evidence seems to show that while deliberate times are somewhat more accurately reproduced than deliberate extents, incidental times show an error greater than either, and this fact, along with the character of the Constant Errors points to separate processes" underlying the reports of the two magnitudes. "There is at least no justification for the attribution of more fundamental character to either. . . ."

By such methods as these we may in any given type of report study the importance of various criteria. It will not uncommonly be the case that verdicts concerning a given kind of material (such as extent of movements, pitch of tones, heaviness of weights, and the like) may be arrived at through all of the methods we have here described; that is, depending on the circumstances, they may represent perceptions, judgments, inferences, or beliefs. In another connection it may be profitable to survey the various fields and materials in which experimental work has been done, and to exhibit these various modes of report in them. But such a project is beyond the scope of this volume.

To designate all verdicts as judgments, merely because they report relations between terms, is quite to overlook the actual psychological processes in favor of the mere verbal propositions that communicate the verdict. The fact that logic has come to call any verbal declarative proposition a judgment should not be allowed to confuse psychological inquiry into the actual processes of thinking. Nor should it deprive psychology of a legitimate and specific use of the term "judgment."

SUMMARY AND CONCLUSIONS

On the basis of these distinctions our classification of the various processes is as follows:

(The Signified) Total Context with the Original Effectiveness	(The Significant) Present Item, with Redintegrative Effectiveness	Psychological Category
A natural relational situation	Identical or similar natural relational situation	PERCEPTION
A natural relational situation	A surrogate natural relational situation	JUDGMENT
A natural relational situation	Effective item or quality, not itself a relation	INFERENCE
A natural relational situation	A surrogate verbal communication, or other form of personal intimation	BELIEF

These definitions have various advantages over those suggested on the basis of degree of confidence. "Perception" retains its position as the name for a direct encounter. "Feeling" is released for use in indicating the affective events, which are themselves a particular type of object. "Belief" is given a connotation at once definite and in keeping with the common recognition of its personal ground, namely, that belief applies only to propositions, these being personal acts. "Judgment" and "Inference" are, to be sure, given specific meanings, which would, if adopted, interfere with the loose use of those terms that is now the fashion. But the well-known difficulty of securing precise use of terms in psychology will effectually prevent these definitions from interfering with the literature.

We have up to this point given special consideration to relations of comparison, in which the relation is that of two items in a scale of magnitude, intensity, or degree.

This special consideration has been accorded the comparative judgment, however, only for the sake of clear presentation. The various ways of reporting relations other than those of comparison display the same distinctions. Thus, in reporting the subject-attribute relation, as in the proposition "That ribbon is yellow," the four types of report may occur. "That ribbon" being given as the object of attention, the report concerns its possession of "yellowness." Now the "yellowness" may be immediately perceived; or it may be judged, as on the basis of an orange color seen on a green background; or (as is said to be the case with certain blind people) the yellow color may be inferred on the basis of a characteristic tactile quality; or the salesman's assertion that the ribbon is yellow may be believed.

In perception, that is, the color itself appears; in judgment a color also appears, but not the color that is reported; in inference the item instigating the report is not a color at all; and in belief the datum is the testimony of another reporter. Generalizing these definitions we have, therefore, the following statements:

In perception the item reported is itself the datum.

In judgment the datum is not the item reported but another item in the same class.

In inference the datum is both a different item and in a different class.

In belief the datum is the report of another witness, and the grounding of this report of the informer is not indicated.

Starting with these definitions there at once arises an array of problems requiring empirical investigation. Thus it seems that in general the confidence and accuracy of the report of perception are greater than those of the judgment; these, in turn, more certain and dependable than those of inference: while least assured and reliable are the belief reports. Yet in certain cases this hierarchy of assurance and truth is departed from.

Thus a color-blind man may come to be more confident of his color inferences than of his color perceptions. Beliefs, again, are far from being always distrusted, and under circumstances they may be as confident and dependable as immediate perception, or they may be confident without being reliable. Thus cases of "negative suggestion" illustrate belief dominant over perception. Even within the belief category there are gradations pointing, for one thing, to the way in which the informant's testimony was itself grounded. Thus the testimony of the eyewitness is given high credence; that based on the informant's judgments and inferences awakens doubt; while the "rumor report" is much distrusted, since the datum of the informant was itself the report of a third party, with its own mode of instigation unvouched for.

Empirical investigation concerns itself chiefly with the study of the "circumstances" affecting the confidence and accuracy of report. A very imposing part of the literature of experimental psychology is concerned with the topic of report, under such captions as perception, discrimination, thresholds, testimony, comparison, memory, sensory acuity, recognition, intelligence, fatigue, learning, reaction-time, practice, psychophysical methods, and the like.

To survey these results from the point of view of our suggested definitions would be an interesting enterprise, and would inevitably suggest new problems for future investigation. This would, however, be an enterprise far exceeding in scope the task to which this volume is dedicated. Each of our main conceptions, if fully developed, leads far afield.

The doctrine of the psychophysical continuum leads into the profound abstractions of metaphysics and epistemology. The mechanism of redintegration is seen to be a principle that constitutes the essential feature of mental process. The definition of judgment, as we have seen, invites a survey of much of the empirical discovery of experimental psychology. Having stated, elaborated, and illustrated these three conceptions, and suggested their wide implications, the present book has achieved its main purpose. It may be brought to conclusion with a very brief review of what has been undertaken in its pages.

CHAPTER XVII

SUMMARY AND CONCLUSIONS

> To conclude: Whatever progress may be made towards the discovery of truth in this matter, I do not repent the pains I have taken in it. The use of such inquiries may be very considerable. Whatever turns the soul inward on itself, tends to concentre its forces, and to fit it for greater and stronger flights of science.
>
> EDMUND BURKE

This completes our survey of the phenomena of sleeping, dreaming, and thinking, and it may be useful now to recapitulate the various points in the order in which they have been presented. This may assist in giving a view of the subject as a whole, and in consolidating it in memory and for purposes of subsequent reflection.

We began by considering the natural phenomenon of sleep, and our surprising indifference to the proportion of human life that it consumes, touching also upon the sleep states of plants and animals, and their probable significance. The physiological and mental symptoms of human sleep were pointed out in detail, and the current explanations of sleep, their various bases and inadequacies, were presented. This led us to a list of crucial tests to be applied as, in part, criteria of a satisfactory explanation of human sleep. Conspicuous among the features of this section were the characteristics of drowsiness, which were seen to be important also in their general bearings on conduct, literature, and art, and on the general phenomena of mental life. These characteristics were discussed and illustrated in some detail.

In the attempt to provide a revised and more satisfactory account of sleep, we undertook a statement of the nervous basis of an integrated personality, and were especially interested in the dissociative tendencies which appear in various forms. These considerations afforded a tentative and suggestive account of sleep as a vestigial instinctive dissociative reaction. The bearings of this account on the facts of sleep and drowsiness were considered.

Before leaving the general consideration of sleep, we had occasion to examine somewhat critically the data relating to sleep habits, the hygiene of sleep, and the relation of sleep to mental growth and efficiency. The question was also raised concerning the existence of slumber and drowsiness as a characteristic of social groups, in which connection the awakening of women was cited as an interesting illustration of the fallacious nature of analogical argument.

Dreams then became the main subject of our discussion. After reference to their popular interest and their place in the thought of primitive people, we undertook an account of the sources, the origins, and the mechanisms of dreaming. We found it to be based on mechanisms of mental reaction already recognized as operating in waking illusions and in the drowsiness experiences. The general tendency, which we named "redintegration," we found to be characteristic of primitive thinking, infantile learning, many of our æsthetic reactions, the symptoms of neurotic patients, as well as of various states of fatigue and exhaustion. Applied to the hallucinations of drowsiness and to the dreams of somewhat more profound sleep, we found this mechanism to relate the dream phenomena in very definite fashion to the details found in these other states of enfeeblement, disintegration, ignorance, or relaxation.

The Freudian account of dreams as wish fulfillments then engaged our attention, and after a few illustrations of the general principles included in this account, we undertook a critical evaluation of the theory. This examination led us to accept as sound those portions of the account that are consistent with or included in the simpler redintegrative mechanism. But we were impelled to reject as fanciful, analogical, and unsubstantiated those features of the Freudian psychology which have been responsible for its recent popular, journalistic, and medical vogue. These features we were led to characterize in the words of another critic as "products of the decorative art."

Our discussion then considered the potency of mental influences in the waking and sleeping life of human beings—such influences as suggestion, expectation, intention, wish, and purpose. These influences were concretely illustrated by studies of the effect of drugs on the sleep and on the working capacity of a group of experimental subjects. Then came brief references to a number of miscellaneous details that have been asserted or reported concerning the relation of dreams to such factors as age, culture, morality, intellectual activity, and common experience, which statements were in most cases submitted to reinterpretation.

We considered next the light thrown by the study of dreams on the thought processes of waking life. It was here seen that thinking, as contrasted with handling or acting, consists in the reaction to and the manipulation of symbols. The dreamy states disclosed the symbolic use of even the most unconventional and apparently irrelevant materials. These items, sensational, perseverative, imaginal, and the like, may function vicariously for the original or primary objects which they "mean." They are enabled to perform this function not because of their own qualities, as isolated items, but more often because of certain relations which they sustain to one another.

These relations, immediately apprehended, themselves function vicariously for the original relations of primary objects. Both terms and relations, that is to say, function redintegratively in determining the course of conduct, whether this be thought or action. The redintegrative mechanism is thus seen to be not only the formative influence of the dreamy states, but also to underlie the psychology of meaning and thought.

We were thus led some distance from the direct study of the dreamy states themselves, through our use of them as instruments in the description and explanation of waking reflection. In the end we were emboldened to offer certain tentative suggestions toward the definition and distinction of some of the simpler modes of intellectual activity, especially those processes commonly designated perception, judgment, inference, belief, memory, and meaning.

In this undertaking we were led to consider the traditional distinction between the world of natural events and the world of mental events—the physical and the psychic. The validity of this distinction was questioned, and some study was made of the practical motives leading to it, historically and genetically. We were impelled to deny the "great gulf" between the physical and the mental, and indicated various types of events and experiences occupying the intermediate region. Instead of the severed worlds of mind and matter, we suggested the conception of the psychophysical continuum.

Study of the behavior of event sequences was seen to reveal two types of sequence—the fixed and the redintegrative, with various intervening degrees of required completeness in the instigating antecedent. The redintegrative sequence we found to be the essential feature of such phenomena as meaning, memory, and thinking. Since this principle was also found to be the fundamental feature of drowsy perception and of dreaming, we find sufficient justification for considering together such apparently unrelated topics as sleeping, dreaming, and thinking.

We next undertook to give, in terms of the formula of redintegration, an account of the nature of meaning, and to interpret the classical descriptions of meaning in the light of this formula. The account was seen not only to be consistent with the conception of the psychophysical continuum, but actually to imply such a conception. This solution of the problem of meaning thus paved the way for a more detailed study of the various forms of thinking. The redintegrative formula was seen to apply in a suggestive fashion even to the world of nature and to the supposedly mysterious facts of logical implication and mathematical necessity.

After consideration of the various levels of meaning, the degrees of completeness in typical situations, some developmental aspects of meaning, and the relation of thought to perception, we undertook an account of the differentia of reasoning as a form of thought. Here we encountered the concept of motive, aim, or control, and were led to suggest that the motive is a second clue, enduring and specifying, within the influence of which the instigating detail functions. Both clues function according to the redintegrative pattern, and reasoning was thus seen to be a particular mode of correlation or type of sequence of natural psychophysical events.

A survey of the status of the topic of judgment in contemporary textbooks yielded a variety of formulations, identifying judgment with fusion of concepts, analysis of total idea, perception of relations, the process of classification, and the attitude or feeling of belief. We sought to bring these views into contrast with one another and to show the bearing of each upon the general account of thinking as a typical sequence of the kind just described.

Having thus emphasized the mechanism of the thought processes, we sought to give specific definitions of more restricted operations, such as those usually designated by the terms perception, judgment, inference, and belief. Examination of contemporary definitions disclosed two groups, one identifying judgment with all the acts of thinking, the other closely identifying it with belief or confidence. A tentative definition in terms of degree of confidence was found to have little to commend it, except its value in exposing the fallacy of the all-or-none concept of confidence. We were then led to describe four fundamental types of report, based respectively on immediate encounter, on surrogate relation, on accessory detail not relational in character, and on personal testimony. These types of report we designated perception, judgment, inference and belief, and sought to show the ramifications of these characteristic processes in typical acts of comparison.

With these convenient phenomenological definitions in mind, all stated in terms of the mode of report of natural events, a great variety of specific psychological inquiries arise concerning the criteria and behavior of various types of report and their variation with a number of circumstances.

Our discussions have touched, in a brief and often in a sketchy fashion, on many problems on which much careful experimental work has been done. Of many of the problems, on the other hand, this cannot be said. Our conclusions have in many cases been tentative or suggestive only, and some have even merely taken the form of questions. If on certain points the argument has seemed arbitrary and dogmatic, it is hoped that this may be attributed not merely to the prejudice of the author, but, in part at least, to the difficulty encountered in attempting to summarize large topics and complicated fields with brevity and in terms that are in the main nontechnical.

There has been throughout no express desire to convert the reader to a special interpretation of facts or phenomena. There has, however, been the persistent confidence that certain conceptions and interpretations will best organize the substantiated conclusions and clarify the numerous outstanding problems of the psychology of thinking. Even those readers who are not inclined to accept these conceptions may through their presentation be led to a fuller perception of the importance of the conclusions and problems and to a keener appreciation of the difficulties encountered by those who have attempted to carry forward our knowledge of the nature of thought. Indeed, our enterprise will not have been in vain if the reader's only reaction is to realize that, after all, sleep is no laughing matter; that dreams are not entirely trivial; and that the fundamental problems of psychology are encountered in their most insistent form in the study of thinking.

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